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Review Article

Effect of Exercise in Management of Knee Osteoarthritis: A Systematic Review

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Abstract: Background: Osteoarthritis is considered commonest cause of disability in elder adults. The knee is the joint most frequently affected by osteoarthritis. Clinically, knee OA is described by pain at weight bearing, soreness, knee movement restriction, crepitation, swelling, edema and inflammation. Physiotherapy as the main choice of conservative management; which includes various strategies such as manual therapy, exercises, patellar taping and electrical modalities with or without thermal modalities as measures for pain reduction. **Aim:** To determine the recent research evidences for the efficacy of exercise in knee osteoarthritis patients. **Method:** This systematic review mainly includes randomized controlled trails. Searching done by Google Scholar, PubMed and PEDro from 2012 to 2021. We used terms like- knee pain, osteoarthritis, exercise and physiotherapy management. **Result**: Present outcomes shows that exercise therapy is effective technique in reducing pain in Knee osteoarthritis patients without adverse effects. The search resulted in 50 articles but only 05 articles were selected for the study based on criteria. **Conclusion**: Therapeutic exercise program designed for knee OA treatment can be more effective at increasing quadriceps muscle activation by reducing pain during exercise.
Keywords: Knee Osteoarthritis, Electrotherapy, Exercise, Physiotherapy.

Introduction

Commonest form of degenerative joint disease is osteoarthritis (OA)[1]. OA affects almost all joints, but knee and hip joints are commonest of them. In the world, it is estimated that 10%–15% of population above 60 years of age are affected by OA. Prevalence is more in females compared to males[2]. Osteoarthritis is considered commonest cause of disability in elder adults[3]. One hundred fifty one million people worldwide experienced OA in 2004 which was ranked sixth as a leading cause of moderate and severe disability[4]. By 2050, 20% of the world's population will be above 60 years of age, according to United Nations[5]. 15% of them will be estimated to have symptoms of OA. One third of those persons will be severely disabled. As a result by 2050, 130 million persons will be suffering from OA worldwide. Out of them 40 million will be severely disabled[5].

Costs associated with OA include costs for adaptive aids and devices, medicines, surgery, and time off at work[6]. The knee is the joint most frequently affected by osteoarthritis. OA knee is two times more prevalent than OA hips in people above 60 years of age[7] and is a significant contributor of pain and mobility impairment in community dwelling adults[1]. Clinically, knee OA is described by pain at weight bearing, soreness, knee movement restriction, crepitation, swelling, edema and inflammation. Pain is most common cause for patients with knee OA to look for medical attention and rehabilitation. If not treated on time, pain and tightness will lead to physical inactivity and dependency[8].

A study done in Asian countries-India, Pakistan and Bangladesh showed a higher prevalence of OA knee in rural areas was 13.7% as compared to 6.9% in urban areas[9]. Community survey data in rural and urban areas of India shows the prevalence of OA to be in the range of 17%–60.6%[10]. A study conducted in India among adults had shown a significant difference in the prevalence of OA between rural (56.6%) and urban areas (32.6%)[10]. Due to the lifestyle habits, Asians have a higher risk for knee joint arthritis compared to Americans and Europeans[9].

Knee osteoarthritis is treated conservatively by decreasing pain, improving knee range, increasing quadriceps (VMO) strength, improving hamstring flexibility affecting ambulation, risk factor education like weight loss and avoiding squatting and cross leg sitting, NSAIDs, and Intra-articular injections. Commonest surgical treatment done by total knee arthroplasty in severe knee OA cases[11].

Physiotherapy as the main choice of conservative management; which includes various strategies such as manual therapy, exercises, patellar taping and electrical modalities with or without thermal modalities as measures for pain reduction[12].

This study was conceived to examine the treatment of knee OA by exercise in order to find out if exercise management approach is consistent with contemporary clinical practice guidelines and recommendations.

Research Design and Setting

This systematic review includes randomized controlled trails mostly as they provide high quality or evidence base.

Inclusions criteria

- ✓ Age greater than or equal to 60 years.
- ✓ Ability to perform physical therapy exercise.
- ✓ Chronic pain in knee for more than 3 months
- ✓ Studies were published in English language only.
- ✓ The study patients have no history of knee surgery.
- ✓ Studies which determined effects of electrotherapy and exercise on Knee OA.

Exclusion criteria

We excluded studies involving children, adolescents, hospitalized patients, or patients in long-term care facilities. We also excluded studies of surgical treatments for knee OA and those that examined PT delivered in rehabilitation programs for adults with knee OA who had knee arthroplasty within 6 months before the study.

Neurological disorder (motor and sensory loss), Diseases and surgeries related to lower limb and spine and Cardio vascular problems with increased heart rate.

Intervention

Considered studies are those which include exercise regardless of intensity and durations. Exercises programs included, strengthening exercises, flexibility exercises, functional training, stretching exercises, balance exercises.

Outcome Measures

The main outcome measures are physical function and muscle strength evaluated by stair climb test, TUG test, 6MW test, locomotive syndrome risk test; 4metres walk distance, Oxford grading Scale, KOOS questionnaire, Pain was assessed with the help of PPT, NPR and VAS[13].

Results

Table 1. Description of the included study

Author	Study Design	Subject	Intervention	Study Duration	Outcome measure	Result
Nejati et al.[14]	Randomized controlled trial	N=56	Group 1: Exercise with non-steroid anti-inflammatory drugs Group 2: sham- non-steroid anti-inflammatory drugs without exercise	12 months follow up	Visual analog scale (VAS), knee and osteoarthritis outcome score (KOOS) questionnaire and functional tests (4 steps, 5 sit up, and 6 min walk test)	Non aerobic exercises for muscles around knee can augment the effect of other therapeutic interventions like medical therapy, acupuncture, and modalities for knee OA.
Messier et al.[15]	Randomized controlled trial	N=377	Group A: high-intensity strength training Group B: low-intensity strength training	18 months follow up	Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) knee pain (0 best-20 worst; minimally clinically important difference [MCID, 2])	Among patients with knee osteoarthritis, high-intensity strength training compared with low-intensity strength training or an attention control did not significantly reduce knee pain or knee joint compressive forces at 18 months. The findings do not support the use of high-intensity strength training over low-intensity strength training or an attention control in adults with knee osteoarthritis.
Chen et al.[16]	Quasi-experimental study	N=171	Group 1: intervention group Group 2: Control group	12 weeks	Numeric rating scale (NRS), Short Portable Mental Status Questionnaire score of 8–10.	HBEI may be effective for relieving KOA symptoms, increasing the physical functioning, and improving quality of life in community-dwelling KOA elderly patients. A large randomized controlled trial with long-term follow-up is needed to confirm these findings.
de Oliveira et al.[17]	Randomized controlled trial	N=100	Group 1: Exercise Group Group 2: Instruction Group	8 weeks twice a week	Timed Up and Go test (TUG), the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and the Lequesne Index.	Quadriceps strengthening exercises for eight weeks are effective to improve pain, function, and stiffness in patients with knee osteoarthritis.
Beckwee et al.[18]	Randomized controlled trial	N=38 3 drop out	Group 1: walking Group 2: strengthening program	3 weeks.	Numeric rating scale (NRS), global self-perceived effect (GPE) on a 7-point ordinal scale	Patients who drop-out show a worse health condition and higher exercise-induced pain levels compared to patients that retained the program.

Discussions

This systematic review was done to examine the effectiveness of exercise therapy interventions in improving quality of life in patients with knee OA. Evidences from RCTs and quasi experimental designs were used to examine the effectiveness of exercise interventions in knee osteoarthritis. In addition to above mentioned evidences, researchers mentioned below also proved physical therapy interventions to be equally effective in decreasing pain and improving functional level in patients with knee OA.

According to Azlin and Lyn [12] clinically, inclusion of joint mobilization into conventional physiotherapy treatment reduces pain greater than conventional physiotherapy alone (44% and 20% respectively) in patients with mild to moderate knee OA[12]. Similarly, Kumar [19] combined complex knee mobilization and electrotherapy and Moss et al. [20], compared tibio-femoral joint mobilization with manual contact and non-contact control treatment interventions, in mild to moderate knee OA patients. Pain reduction following joint mobilization has been established in previous studies[19,20].

Bennell et al. [21], conducted a double blinded RCT in knee OA patients from community which showed improvement of similar magnitude in pain and function in both groups receiving either physiotherapy intervention or placebo. This shows that the physiotherapy intervention in this research does not have greater benefits. In this study, the improvements were seen immediately after treatment, this might be due to fluctuation of symptoms in patients with chronic conditions over the time seeking medical care and attention when their symptoms are at its worst phase[21].

Jamtvedt et al. [22] compared the treatment results from systematic reviews. Usually many elements were included in quality of care but in his study he focused on one important factor which contributes to quality of care is clinical effectiveness factor. Most of the researchers in this review included exercise in their treatment sessions. 35% of them utilized interventions like acupuncture, TENS or LASER therapy which showed moderate quality research in pain reduction. Some of them used other physical therapy interventions and modalities such as, traction, stretching and massage and which showed poor quality evidence as well. The researchers used many types of exercises so, they merged them as one treatment modality. They also separated exercise and weight loss from pscycho-education and self-treatments interventions. These systematic reviews concluded that exercise and weight reduction improves quality of life in knee OA patients. Exercise prescription proved to be most effective and common treatment intervention. Still, we need more evidence to establish best physical therapy treatment protocol to improve quality of care[22].

Min Oo et al. [23], suggested further high-quality RCTs are required to prove the effectiveness of electrical stimulation and LASER therapy in treatment of knee osteoarthritis. Although their findings were consistent in the positive response of ultrasound with other meta-analysis. In addition, further studies are needed to investigate the usefulness of these modalities in delaying structural progression or improving the structural outcomes such as synovitis, cartilage thickness or bone marrow lesions by using sensitive imaging methods like-musculoskeletal ultrasound or MRI[23]. According to Phil Page [24] adding TENS to a therapeutic exercise program for knee OA can be more effective at increasing quadriceps muscle activation by reducing pain during exercise. In addition, knee OA patients can improve self-reported function with exercises including strength and balance training, either with or without TENS[24].

Kocaman et al. [25] found electrical stimulation as effective as exercise in treatment of knee OA, weakness of quadriceps muscle or prevention of atrophy. Electrical stimulation intervention can be used alone or in conjunction with exercises in clinics and isometric exercises can be used for home exercise program[25]. According to Polat et al. [26] TENS is effective in increasing physical activity and decreasing pain in knee OA patients. TENS works as neuropathic pain component and can be used along with medication side effects from medicine and gradually weaning off from drugs[26]. Kirthika, et al. [27] compared the mean values of VAS and WOMAC scores in 2 groups, both of

them showed statistically significant reduction ($P < 0.001$) in the posttest values. But experimental group proved to be more effective than conventional group. Thus, study concludes that combining of proprioceptive exercises along with conventional physiotherapy for 3 months is more effective than conventional physiotherapy alone in Knee OA Patients[27].

Conclusion

This systemic review was conducted to investigate the efficacy of exercise therapy treatment methods designed to improve physical function in knee OA patients by summarizing the evidences from randomized controlled trials (RCTs), experimental design and quasi experimental designs. We conclude that therapeutic exercise program designed for knee OA treatment can be more effective at increasing quadriceps muscle activation by reducing pain during exercise. In addition, knee OA patients can improve self-reported function with exercises including strength and balance training, either with or without electrotherapy.

Conflicts of interest: No potential conflict of interest was reported by the authors.

References

1. Corti MC, Rigon C. Epidemiology of osteoarthritis: prevalence, risk factors and functional impact. Aging Clin Exper Res. 2003;15(5):359-63.
2. Shamsi S, Al-Shehri A, Al Amoudi KO, Khan S. Effectiveness of physiotherapy management in knee osteoarthritis: A systematic review. Indian J Med Special. 2020;11(4):185-91.
3. Laupattarakasem W, Laopaiboon M, Laupattarakasem P, Sumananont C. Arthroscopic debridement for knee osteoarthritis. Cochrane Data Syst Rev. 2008(1):CD005118.
4. World Health Organisation. Global Burden of Disease Study 2004. WHO;2008.
5. United Nations. World Population to 2300. Available at: http://www.un.org/esa/population/publications/.../WorldPop2300final.pdf
6. Maetzel A, Li LC, Pencharz J, Tomlinson G, Bombardier C. The economic burden associated with osteoarthritis, rheumatoid arthritis, and hypertension: a comparative study. Annals Rheum Dis. 2004;63(4):395-401.
7. Scott D, Kowalczyk A. Osteoarthritis of the knee. http://clinicalevidence.bmj.com. 2007; (Accessed 20 December 2009).
8. Symmons D, Mathers C, Pfleger B. Global burden of osteoarthritis in the year 2000. Geneva: World Health Organization. www.who.int/healthinfo/statistics/bod_osteoarthritis.pdf.
9. Fransen M, Bridgett L, March L, Hoy D, Penserga E, Brooks P. The epidemiology of osteoarthritis in Asia. Int J Rheum Dis. 2011;14(2):113-21.
10. Sharma MK, Swami HM, Bhatia V, Verma A, Bhatia SPS, Kaur G. An epidemiological study of correlates of osteo-arthritis in geriatric population of UT Chandigarh. Indian J Community Med. 2007;32(1):77-78.
11. Meena V, Shanthi C, Madhavi K. Effectiveness of PNF stretching versus static stretching on pain and hamstring flexibility following moist heat in individuals with knee osteoarthritis. Int J Physiother. 2016;3(5):529-534.
12. Azlin N, Lyn KS. Effects of passive joint mobilization on patients with knee osteoarthritis. Sains Malays. 2011;40(12):1461-5.
13. Ornetti P, Dougados M, Paternotte S, Logeart I, Gossec L. Validation of a numerical rating scale to assess functional impairment in hip and knee osteoarthritis: comparison with the WOMAC function scale. Ann Rheum Dis. 2011;70(5):740-6.

14. Nejati P, Farzinmehr A, Moradi-Lakeh M. The effect of exercise therapy on knee osteoarthritis: a randomized clinical trial. Med J Islam Repub Iran. 2015;29:186.

15. Messier SP, Mihalko SL, Beavers DP, Nicklas BJ, DeVita P, Carr JJ, Hunter DJ, Lyles M, Guermazi A, Bennell KL, Loeser RF. Effect of high-intensity strength training on knee pain and knee joint compressive forces among adults with knee osteoarthritis: the start randomized clinical trial. JAMA. 2021;325(7):646-57.

16. Chen H, Zheng X, Huang H, Liu C, Wan Q, Shang S. The effects of a home-based exercise intervention on elderly patients with knee osteoarthritis: a quasi-experimental study. BMC Musculoskel Disor. 2019;20:160:1-11.

17. de Oliveira AMI, Peccin MS, da Silva KNS, Teixeira LEPDP, Trevisani VFM. Impact of exercise on the functional capacity and pain of patients with knee osteoarthritis: a randomized clinical trial. Rev Bras Reumatol. 2012;52(6):876-82.

18. Beckwée D, Bautmans I, Scheerlinck T, Vaes P. Exercise in knee osteoarthritis–preliminary findings: exercise-induced pain and health status differs between drop-outs and retainers. Experiment Gerontol. 2015;72:29-37.

19. Kumar S. Effect of knee complex mobilization on pain and active range of motion arc in osteoarthritis knee joint. Phys Ther Sport. 2006;7(4):176.

20. Moss P, Sluka K, Wright A. The initial effects of knee joint mobilization on osteoarthritic hyperalgesia. Man Ther. 2007;12(2):109-18.

21. Bennell KL, Hinman RS, Metcalf BR, Buchbinder R, McConnell J, McColl G, Green S, Crossley KM. Efficacy of physiotherapy management of knee joint osteoarthritis: a randomised, double blind, placebo controlled trial. Ann Rheum Dis. 2005;64(6):906-12.

22. Jamtvedt G, Dahm KT, Holm I, Flottorp S. Measuring physiotherapy performance in patients with osteoarthritis of the knee: a prospective study. BMC Health Serv Res. 2008;8:145.

23. Min Oo W, Thae Bo M. Efficacy of physical modalities in knee osteoarthritis: recent recommendations. Int J Phys Med Rehabil. 2016;4:3.

24. Phil Page. Exercise with TENS more effective for knee osteoarthritis. J Orthop Sports Phys Ther. 2011;41(1):4-12.

25. Kocaman Ö, Koyuncu H, Dinç A, Toros H, Karamehmetoğlu FS. The Comparison of the Effects of Electrical Stimulation and Exercise in the Treatment of Knee Osteoarthritis. Turk J Phys Med Rehabilil. 2008;54(2):54-58.

26. Polat CS, Doğan A, Özcan DS, Köseoğlu BF, Akselim SK, Onat ŞŞ. The effectiveness of transcutaneous electrical nerve stimulation in knee osteoarthritis with neuropathic pain component: a randomized controlled study. Turk J Osteoporos. 2017;23(2):47-51.

27. Kirthika V, Sudhakar S, Padmanabhan K, Ramachandran S, Kumar M. Efficacy of combined proprioceptive exercises and conventional physiotherapy in patients with knee osteoarthritis: a double-blinded two-group pretest–posttest design. J Orthop Traumatol Rehabil. 2018;10(2):94-7.

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