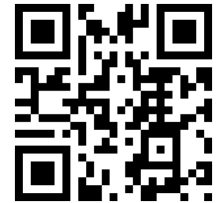


Exercise Therapy for Knee Osteoarthritis to Reduce the Pain: A Systematic Review



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ABSTRACT: The purpose of this study was to assess the value of different models exercise therapy emphasizing exercise for the management of knee osteoarthritis. This analysis included data from four trials with a total of 1,317 individuals. The exercise therapy models included were exercise therapy, elastic band therapy, traditional wuqinx therapy, and tai chi. The trials included in this meta-analysis suggest that people with knee osteoarthritis may benefit greatly from exercise-based therapy in terms of pain reduction, improved function, and improved quality of life. These findings suggest that exercise-based therapy offers a nonpharmacological, low-risk, and cost-effective treatment option for knee osteoarthritis. Exercise-based therapy should be considered as a primary treatment option for patients with knee osteoarthritis by all health care practitioners. Future research should explore the potential benefits of combining exercise-based interventions with other treatment options and determine the optimal exercise program for different stages of knee osteoarthritis.

KEYWORDS: Exercise, Therapy, Knee osteoarthritis.

I. INTRODUCTION

Knee osteoarthritis is a degenerative joint disease of the articular cartilage that impacts the lives of millions of people throughout the world, especially affecting the elderly, causing disability (Ravalli et al., 2022). Although there is currently no cure for knee osteoarthritis, exercise therapy has become an increasingly popular alternative treatment option for this disease (Kumar et al., 2020). Knee osteoarthritis (KOA) is a chronic degenerative disease of the knee joint, and knee joint pain is the most common clinical manifestation (Emery et al., 2019).

The worldwide prevalence of radiographically confirmed symptomatic KOA is estimated to be 3.8%, and the prevalence of this disease has increased to more than 10% in people older than 60 years (Brophy & Fillingham, 2022). In China, the prevalence of KOA among older people is approximately 8.5% (Ren et al., 2020), and the incidence of KOA has increased significantly among younger people (Chen et al., 2021). KOA has a serious impact on the health status of patients and overall quality of life and can even cause a serious economic burden on society (Wojcieszek et al., 2022). Clinical guidelines recommend that relieving pain in the knee is a primary target of KOA treatment (Arden et al., 2021).

The aim of this systematic review is to analyze the data, by reviewing the results of previously conducted studies on knee osteoarthritis, whether exercise therapy is effective in treatment or not. This evaluation will consider various types of exercise therapy that have been used previously, including aerobic activities, stretching exercises, and strengthening treatments. In addition, the review will pay attention to the length of time the treatment is carried out and the level of intensity in its implementation. The findings of this study will provide important and in-depth information regarding the efficacy of exercise therapy in treating knee osteoarthritis. These results can also help in determining appropriate therapeutic recommendations in the future, especially to reduce pain in knee osteoarthritis.

The results of this systematic review can assist healthcare professionals in making judgments about the most effective and appropriate therapy for patients with knee osteoarthritis. This may also help in the development of exercise therapy guidelines and recommendations for the treatment of knee osteoarthritis, which could potentially have a significant impact on pain reduction, increased range of motion, and knee joint function or quality of life.

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II. METHOD

In order to ensure that the systematic review is comprehensive and that the researcher has identified all relevant studies and using a combination of keywords and MeSH (Medical Subject Heading) terms, such as “AND,” “OR,” and “NOT” were also used to combine search terms. The researcher has searched the Scopus, PubMed, Cochrane Library, Google Scholar, and Medline databases using a pre-defined search strategy, from January 2019 to date, to ensure that he only included recent studies to conduct a comprehensive literature search. The search strategy was as follows: (“knee” AND “osteoarthritis” OR “knee osteoarthritis”) AND (“therapy” AND “exercise”).

These inclusion and exclusion criteria were established by the researchers to conduct a systematic review of the effectiveness of exercise therapy for the treatment of knee osteoarthritis.

Inclusion criteria	Exclusion criteria
Studies evaluating the effects of exercise therapy on knee osteoarthritis.	Studies that did not assess the efficacy of exercise therapy involving exercise for the treatment of knee osteoarthritis.
Observational studies, clinical trials, cohort, casecontrol studies, and RCTs.	Studies that are not peer-reviewed, such as conference proceedings and abstracts.
Research that has been published in Indonesian and English	Research that was published in a language other than Indonesian and English.
Studies published between January 2019 and the current date.	Studies published before January 2019.

The researchers conducted a two-stage screening process to select the studies included in this systematic review. In the first stage, the researchers screened the titles and abstracts of the identified articles to determine their relevance to the research question. In the second stage, to ensure that the selected articles met the inclusion criteria mentioned above, the researchers read each article in its entirety.

Researchers used a narrative synthesis approach to summarize the findings of the selected studies. Researchers provided a detailed description of each clinical trial, including its design, patients, treatment duration, interventions, and outcomes.

III. RESULT AND DISCUSSION

The literature search identified 1.320 articles. Then researchers conducted a two-stage screening process to select the studies included in this systematic review. In the first stage, the researchers screened the titles and abstracts of the identified articles to determine their relevance to the research question. In the second stage, to ensure that the selected articles met the inclusion criteria mentioned above, the researchers read each article in its entirety. The study analyzed findings from four additional studies with a total of 1.317 individuals, all of which provided substantial evidence supporting the use of exercise therapy in the treatment of knee osteoarthritis. The studies showed that exercise therapy treatment resulted in significant improvements in patients’ pain levels, as well as improving their knee function and overall quality of life.

Study	Study Design	Participants	Intervention	Duration of treatment	Comparison	Outcome Measures	Results
Goh et al., 2019	Systematic review and meta-analysis	N = 15	Exercise therapy	8 weeks.	Control groups	Pain, function, quality of life, adverse events	Exercise therapy resulted in significant improvements
(LeónBallesteros et al., 2020)	RCT	N =32	Kinesiotape and quadriceps strengthening with elastic band	6 weeks	Control groups	WOMAC (pain, stiffness and functionality), VAS	Relief pain, improve functionality, and decrease stiffness

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(Xiao & Li, 2021)	Prospective	N =284	Wuqinx	24-weeks	Control groups	Limits of stability tests, static posture stability tests, dynamic fall index tests, WOMAC, and SF-36	Reduce pain, improve balance function, and improve subjective quality of life
Hu et al., 2021	Systematic review and meta-analysis	16 studies (N =986)	Tai Chi	five weeks and 52weeks.	Control groups	WOMAC, 6-MWT, dynamic balance, and physiological and psychological health	Reduce pain, maintain mobility, enhance muscle strength, enhance range of joint motion, and ameliorate physical and mental health

The study was conducted by Goh et al., (2019) and was a systematic review and meta-analysis of 15 RCTs that looked at the effectiveness of exercise therapy for knee osteoarthritis. This study was conducted to determine whether physical activity could be beneficial in the management of knee osteoarthritis. The results of this study showed significant improvements in pain reduction, function, and quality of life were seen in the exercise treatment group compared to the control group, as indicated by the results of the meta-analysis. The findings of this study also revealed that exercise therapy was completely risk-free and did not come with any significant side effects.

On the other hand, treatment with exercise therapy was shown to produce substantial improvements in pain, function, and quality of life when compared to a control group in another study conducted by (Goh et al., (2019). The researchers can conclude from this study that any exercise therapy program has the potential to be beneficial in the treatment of knee osteoarthritis. The results of this study provide conclusive evidence that exercise-focused therapy is an effective treatment for knee osteoarthritis.

A study conducted by León-Ballesteros et al., (2020) aimed to determine the effectiveness of strengthening therapy using kinesiotaping in women with knee osteoarthritis to reduce pain. However, the results of the study showed that exercise using kinesiotaping with elastic bands did not significantly reduce pain better than strengthening exercise therapy on the quadriceps muscle in patients with knee osteoarthritis.

Wuqinx is a traditional Chinese exercise that was designed by Hua Tuo at the end of the Eastern Han Dynasty. It can release muscle tone and increase blood flow, thereby relieving pain. Long-term Wuqinx can significantly enhance the physical function of chronically ill patients, improving their strength, bone density, balance, joint flexibility, mental vitality, and psychological confidence (Zeng et al., 2021). A randomized controlled trial showed that from pretest to follow-up, KOA patients in the Wuqinx group showed significantly improved, isokinetic knee flexion, and extension strength, timed up and go test, 6-min walk test, 30s chair stand test, and their pain was much relieved. This research showed that Wuqinx promotes balance and pain relief in KOA patients more effectively than traditional physiotherapy exercises. In addition, Xiao et al. found that the stability test, the static postural stability test, and the dynamic fall index test results of elderly, female KOA patients improved after 24weeks of Wuqinx (Xiao & Li, 2021). In short, Wuqinx is a very suitable exercise for elderly people, which can enhance the balance of KOA patients, reduce pain, and increase muscle strength. However, there is not enough research on Wuqinx. More profound and relevant studies are needed.

Tai Chi, a gentle aerobic exercise, is derived from ancient Chinese martial arts that can relax the body and mind. Compared with other conventional physical therapy, Tai Chi has a better treatment effect on reducing depression (Li et al., 2020). A clinical experiment showed that Tai Chi can change KOA patients' gait and plantar pressure load pattern during walking. Tai Chi can be an excellent physical training strategy for improving postural control and walking function in older individuals with KOA. Furthermore, Tai Chi has positive effects on muscular activities and proprioception of the leg and ankle, and it can improve

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balance on both rigid and foam surfaces in older patients with KOA. Hu found that Tai Chi can significantly reduce pain and dysfunction, improve KOA patients' physical and mental health, which can be an alternative to non-drug therapies in rehabilitation programs (Hu et al., 2021). In conclusion, Tai Chi is a popular mind-body exercise, which can relieve pain, reduce KOA dysfunction, and has significant effects on improving depression, training gait, and postural stability. However, the effect of Tai Chi is slow, it always takes more than 2 weeks to get the effect.

The findings of this study suggest overall that exercise-based therapy can be an effective treatment for knee osteoarthritis. It appears that exercise routines that involve all three forms of movement such as stretching, strengthening, and aerobics are most effective in terms of reducing pain, improving function, and enhancing quality of life. However, further research is needed to determine the most beneficial exercise programs for different stages of knee osteoarthritis, the optimal duration and intensity of exercise, and the benefits of exercise-based therapy treatment during treatment.

IV. CONCLUSIONS

In this study, researchers found that exercise-focused therapy was more successful than other treatments for knee osteoarthritis. The results of the four studies included in this meta-analysis suggest that exercise-based therapy can help people with knee osteoarthritis experience significant pain reduction, improved function, and improved quality of life.

The implications of these results are important not only for those with knee osteoarthritis but also for those working in the medical field and those who determine public policy. An alternative treatment option for knee osteoarthritis that does not require the use of drugs, has minimal risks, and is cost-effective is exercise-focused therapy. Individuals with knee osteoarthritis should be encouraged to engage in exercise therapy regularly as part of their treatment strategy. Exercise-based therapy should also be considered as a first-line treatment option for patients with knee osteoarthritis.

Furthermore, these data suggest the need for additional studies to determine the optimal exercise therapy routine for different phases of knee osteoarthritis, the most effective duration and intensity of exercise, and the long-term effects of exercise-based therapy. The potential benefits of integrating exercise-based therapy with other alternative or primary treatment options need to be investigated in future studies.

Overall, exercise-based therapy is a promising and beneficial treatment option for individuals with knee osteoarthritis. This systematic review provides strong evidence for the efficacy of exercise-based interventions and supports the incorporation of a routine exercise therapy program as part of the standard of care for knee osteoarthritis.

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