



## **A Systematic Review: Does Land based Exercise Improve the Quality of Life in Patient with Knee Osteoarthritis?**

**Sabina Afifatuzzahra\*<sup>1</sup>, Suryo Saputra Perdana<sup>2</sup>, Amalia Nur Azizah<sup>3</sup>**

<sup>1,2</sup> Physiotherapy, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia

<sup>3</sup> Physiotherapy Profession, National Paralympic Committee Clinic, Indonesia

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### **Abstract**

Quality of Life (QoL) is a crucial aspect of an individual's well-being, and Knee Osteoarthritis (OA) is a chronic degenerative disease that significantly impacts QoL. OA patients experience functional impairment, leading to difficulty and pain in activities such as standing, squatting, walking, and climbing stairs. Land-based exercise is a non-pharmacological intervention recommended for long-term knee pain, as it can improve muscle strength, relieve pain, and improve function. However, excessive exercise can worsen pain. This systematic review evaluates literature on land-based exercise interventions that show significant effects on QoL and decrease in knee pain for patients with knee OA. The review includes six publications with randomized controlled trials and experimental studies that examined the impact of land-based exercise on knee OA. The review focuses on exercises such as yoga, strengthening exercises, Tai Ji, and Wuxinqi Exercise. The review finds that land-based exercise has a positive impact on physical function, pain reduction, and quality of life for patients with knee OA. Three publications with yoga and Wuxinqi Exercise showed significant results in pain management, increasing knee strength, and reducing pain in knee OA patients. The review concludes that land-based exercise is an appropriate intervention for people with knee OA related to pain and functional impairment.



## INTRODUCTION

The concept of quality of life is used as an indicator or outcome evaluation of the quality of health services. The value of the results of a therapy or treatment performed on patients, which includes well-being, survival, and independence in daily activities, is the intended outcome indicator or evaluation. Disease is one of the factors that can have an impact on one's quality of life. One of the diseases that affect quality of life is knee osteoarthritis. For people 20 years of age and older, the pooled global incidence of knee OA was 203 per 10,000 person-years (95% CI, 106–331). Consequently, an estimated 86.7 (95% CI, 45.3–141.3) million people (20 years of age and older) globally will have incident knee OA in 2020 (Cui et al., 2020).

Knee osteoarthritis is a gradual degenerative (aging) disease that produces calcification of the joints. The most common cause of impairment in adults, osteoarthritis (OA), with serious concomitant conditions and no known solution (Messier et al., 2024). Osteoarthritis (OA) is a chronic degenerative illness that primarily affects the articular cartilage of synovial joints, followed by bone remodeling and overgrowth at joint borders (Vaghela et al., 2020). OA is a worldwide disease for pain and disability (Kloek et al., 2014). People who suffer from osteoarthritis (OA) have recognized pain and difficulties doing daily tasks as the most significant issues related to their condition (Wang et al., 2016). The most common musculoskeletal condition, osteoarthritis, lowers quality of life and causes functional deterioration (Pereira et al., 2015). For a considerable time, osteoarthritis (OA) has been viewed as an age-related degenerative condition that cannot be reversed unless the joint is

replaced with a prosthesis. Although there is still no fully curative treatment, non-pharmacological, interdisciplinary care has helped to advance existing procedures (Gay et al., 2016). A restricted range of motion (ROM), stiffness, and soreness are the hallmarks of this condition that affects over 250 million people worldwide, or 4% of the total population (Sengkey, et al., 2019). Patients with knee osteoarthritis will experience functional impairment that has a severe impact on their quality of life, with difficulty and pain in the knee when getting up from sitting, squatting, standing, or walking, going up and down stairs, and other activities that place strain on the knee. Due to stiffness, pain anxiety, or prior instructions to avoid exercise, people with OA may first be reluctant to engage in physical activity (Coleman et al., 2012). People with osteoarthritis in their knees were shown to have a low quality of life. Their level of social, psychological, and physical well-being was below that of a healthy person (Asif et al., 2022). But, It has been discovered that exercise improves quality of life in several ways, such as increasing psychological well-being, increasing muscle strength relevant to everyday activities, and improving or preserving cartilage integrity (Septiawan et al., 2023)

Patients who have knee osteoarthritis can increase their quality of life through rehabilitation, one of which is the Land Based Exercise method. Every major guideline recommends exercise therapy as the first line of treatment for individuals with KOA because it is both efficient and affordable (Bell et al., 2022). Land-based exercise is a non-pharmacological intervention that is the most recommended long-term intervention for knee pain because it can help increase muscle strength, relieve pain, and improve function. The

important things or goals if KOA treat it to reduce pain and improve physical function (Hall et al., 2018). Furthermore, this exercise improves the elderly's Quality of Life, including psychological and muscle involvement when performing functional activities. Land-based exercise can help control short-term pain and maintain physical function for an extended period of time, namely 2 to 6 months after knee pain intervention. However, when providing land-based exercise, the dose of exercise must be carefully monitored because excessive exercise will worsen pain (Pristianto et al., 2022). This research discovered that land-based exercise can reduce pain, improve function, and improve quality of life in patients with knee osteoarthritis (Khruakhorn & Chiwarakranon, 2021).

There are many different types of exercise therapy, and they have both systemic and local effects. Some of these effects have been studied in individuals with osteoarthritis (OA) of the knee. A variety of focused physical activities are included in the category of therapeutic exercise, all of which are intended to enhance joint range of motion, muscular strength, neuromotor control, and cardiovascular fitness. (Fransen et al., 2014)

This review's objective is to examine the literature to see if there is any support for this theory (Sattler et al., 2023). Analyzed land-based exercise such as hatha yoga, specific training, resistance training or tai ji, and wuqinxi exercise and how it affected quality of life (QoL) in people who have knee osteoarthritis. The quality of the evidence supporting land-based exercise has been deemed high (Fransen et al., 2014). Furthermore, the objective of this systematic review was to assess the existing literature in order to identify the type of land-based exercise intervention

that has a significant effect or improvement on QoL and knee pain reduction in patients with knee osteoarthritis.

## METHODS

### 1. Study Design

This study is a systematic review. The data collection is obtained from database PubMed. This literature search with the keyword "Osteoarthritis Knee", "Exercise", and "Quality of Life"

### 2. Inclusion Criteria

The inclusion criteria were land-based exercise therapies aimed to improve QoL and reduce knee pain for Knee Osteoarthritis patients.

### 3. Exclusion Criteria

Other than knee OA, aquatic-based exercise and surgical treatments is among the exclusion criteria.

### 4. Study Extraction

Each manuscript was assessed based on the journal it was published in and its key characteristics. And the functional disability of Knee Osteoarthritis was measured by The Western Ontario and McMaster University Arthritis Index (WOMAC). And the quality of the journal used Pedro scale. Figure 1 contain overview of the data.

### 5. Data Synthesis

The following purpose of the study, population, ages, intervention and outcome measurement is on Table 1. The author's, Title of the article, study design, result and conclusion of each article is extracted into a matrix.

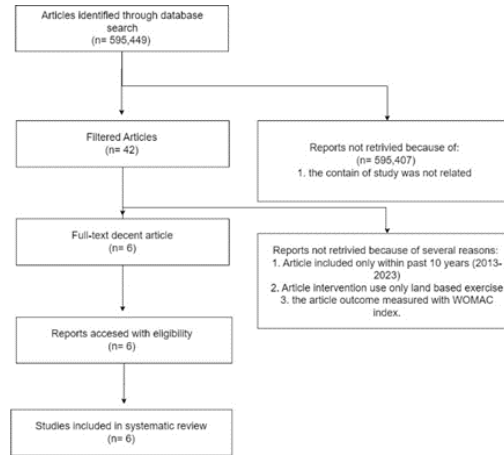
### 6. Quality of Evidence

The quality of evidence used Physiotherapy Evidence Database (PEDro). With 11 items in i

## RESULT

### 1. Identification and Article Selection

The process of selecting the articles used PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart is on Figure 1.



**Figure 1.** Results of Prisma Flow Diagram

In search for articles that match the previous criteria, researchers are looking for articles using the PubMed database with a maximum publication year of 10 years (2013-2023). In the initial search, 595,449 articles were found. Then, these articles were filtered to just 42 because they did not meet the criteria and were not related to the study

conducted. After that, the articles were filtered again to 6 because they met the criteria for publication year 2013-2023, the intervention was only land-based exercise, and the outcome was measured with WOMAC. Finally, there were 6 studies included in this systematic review.

### 2. Quality of Evidence

**Table 1.** Results of PEDro Scale for quality of Evidence

No.	Study	Question	1	2	3	4	5	6	7	8	9	10	11	Total
1.	Cheung et al. (2014)		Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	No	7
2.	Vaghela et al. (2020)		Yes	Yes	No	No	No	Yes	No	Yes	Yes	No	No	5
3.	Perdana et al. (2022)		Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	9

4.	Michael et al. (2013)	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	No	7
5.	Chun et al. (2021)	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	No	7
6.	Zhigang Xiao (2021)	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	No	No	6

Each study's risk of bias score was displayed in Table 1. The Physiotherapy Evidence Database (PEDro) was utilized by the researchers to evaluate each RCT's risk of bias. The PEDro scale offers a reliable way to assess the methodological quality of controlled trials and has a reasonable to good level of inter-rater reliability. 11 items on the PEDro scale were used to determine whether the methodological components were present

or absent. If the PEDro database was accessible, the score was immediately pulled from it; otherwise, the researcher evaluated the study themselves. The study was divided into high quality (PEDro score >6) and low quality (PEDro score <6) using a preset manner, and any disputes were handled by a third reviewer. Using the results of evaluating the journals' qual

### 3. Study Characteristic

**Table 2.** Characteristic of Included Study

Author	Diagnose	Purpose of the Study	Participants	Age	Intervention
Cheung et al.	KOA	To determine whether a Hatha yoga exercise program is feasible and potentially effective in treating OA-related symptoms in older women with KOA.	36 eligible participants with KOA	72 years. (mean age)	Hatha yoga
Vaghela et al.	KOA	To research the efficacy of non-pharmacological treatment plans, including yoga and traditional physiotherapy, in increasing health and quality of life for KOA patients.	100 participants with KOA	Aged 40-70 years.	Yoga and Physiotherapy conventional.
Suryo et al.	KOA	To determine whether specific training is useful in helping KOA patients walk faster and with improved physical function.	Patient with KOA	NR	Program with specific training

Michael et al	KOA	To assess the efficacy of Tai Ji exercise and resistance training in treating KOA symptoms.	Patient with KOA	NR	Resistance training or Tai Ji exercise training
Chun et al	KOA	to compare, after three months, the exercise compliance and long-term outcomes of an at-home Wuqinxy exercise program for older people with KOA.	older adults in the neighborhood who had KOA.	NR	WQX exercise program at home
Zhigang xiao et al	KOA	to research the impact of wuqinxi exercises on elderly people's subjective quality of life and balancing function.	Female KOA patients	NR	Wuqinxi exercise program

The land based exercise interventions are varied, including Yoga, Tai Ji, specific training programs and Wuqinxi exercise. 6 studies reported by

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) measures function.

#### 4. Result of Article Research

**Table 3.** Result of Article Research

Author (Year)	Title	Method	Results	Conclusion
(Cheung et al., 2014)	Yoga for Managing Knee Osteoarthritis in Older Women: A Pilot Randomized Controlled Trial	Randomized Control Trial	used ANCOVAs, with 95% of the study's participants retained. Participants in the treatment group showed a significant improvement in their WOMAC pain scores. decrease in sleep disruption. The changes in BMI and Quality of Life, however, were not substantial. Furthermore, there were no adverse yoga-related occurrences reported.	Yoga program with home program for women (elderly) with KOA appears to be a practical and safe option that helps lower extremity symptoms and function. The result for QOS and QOL is ambiguous or inconclusive. In fact, yoga is secure for older women with KOA.
(Mohebi et al., 2018)	Promoting health and quality of life of patients with osteoarthritis of knee joint through non-pharmacological treatment strategies: A	Randomized Control Trial	The study's findings demonstrate a significant improvement in both groups WOMAC and SF 36 scores at the conclusion after 15 and 30 days of therapy; however, when compared to the control group, the experimental group showed a more significant improvement (P 0.05) in WOMAC and SF 36 scores.	When combined with traditional physiotherapy, yoga is more effective at promoting health and raising QOL in those with OA of the knee joint.

	randomized controlled trial			
(Perdana et al., 2022)	Effectiveness of Specific Training on Physical Functional Improvement and Walking Speed in Patients with Knee Osteoarthritis	Experimental study	Patients with KOA who underwent specific training saw an improvement in their physical health and gait speed. No difference in pain and stiffness was seen after specialized training.	In patients with knee osteoarthritis, task-specific training enhances functional capacity and walking performance.
(Wortley et al., 2013)	Effects of resistance and Tai Ji training on mobility and symptoms in knee osteoarthritis patients	Experimental study	Resistance training significantly improved the timed up and go test with (p=0.001), WOMAC pain score (p=0.006), WOMAC stiffness (p=0.001), and WOMAC physical function (p=0.011).  And then for the Tai Ji Group:  Significantly improves the timed up and go test (p,0.001), but no significant improvement at WOMAC scores index.	Resistance training proved successful in enhancing mobility and alleviating knee OA symptoms. Tai Ji improved mobility as well, although it had little effect on symptoms of knee OA.
(C. M. Xiao et al., 2021)	Follow-up of a Wuqinxi exercise at home programme to reduce pain and improve function for knee osteoarthritis in older people: a randomized controlled trial	Randomized Control Trial	The WQX group has positive impact in all measures from follow up of post test, while the control group show significant reductions in WOMAC pain, knee extensor strength, and knee flexor strength.	The WQX program was a successful at-home fitness program that had high levels of adherence in these communities' older persons with KOA..
(Z. Xiao & Li, 2021)	The effect of Wuqinxi exercises on the balance function and subjective quality of life in elderly, female	Randomized Control Trial	The experimental group showed better performance than the control group in various tests, including:  LOS, SPS evaluation,  And DFI  During the baseline to week 24 follow-up period, the two	WQX exercises improve the balance and subjective quality of life of female (elderly) patients with KOA. The medication successfully lowers clinical symptoms in the knees of older female osteoarthritis patients..

knee osteoarthritis patients	groups demonstrated significant differences in:  WOMAC tests,  Pain levels,  Joint stiffness, and  Lower limb muscle strength
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## DISCUSSION

This systematic review aimed to investigate the effect of land-based exercise for the quality of life of patients with knee osteoarthritis by drawing robust and well-founded conclusions from related research. Several studies have suggested that land-based exercise improves physical function in KOA patients. Exercise on land increases cardiorespiratory endurance and quality of life (Tamin & Loekito, 2018). Land based exercises included in this systematic review are exercises such as yoga, strengthening exercises, Tai Ji, Wuxinqi Exercise. Land-based exercise has been shown in 6 publications with RCT and experimental studies to reduce pain and increase functional activity. However, WOMAC results were not statistically significant in three related publications. Three publications, however, with Yoga and Wuqinxi Exercise, showed significant WOMAC results in pain management, increasing knee strength, and reducing pain in KOA patients. Despite the fact that physiotherapists agree that knee OA cannot be treated, they are responsible for delaying disease progression, reducing pain, joint stiffness reduced, and improving functionality in knee OA patients. As a result, they will be able to perform daily living more effectively, improving their quality of life. However, there are land-based exercises that can

help KOA patients reduce pain, such as Yoga, Tai Ji, and Wuqinxi.

This systematic review is expected to assist therapists in determining the appropriate type of exercise for patients with KOA. Land-based exercise combined with Yoga therapy, for example, has resulted in participants experiencing a significant decrease in WOMAC pain scores as well as a decrease in sleep disturbance. However, no significant changes in Quality of Life (QOL) or BMI were observed. Furthermore, no adverse events associated with yoga were reported. Physiotherapists may help slowing the KOA disease, lowering pain levels, reducing joint stiffness, and enhancing functional skills in patients with knee OA, even if they agree that there is no treatment for the condition. As a consequence, their quality of life will increase since they will be able to perform daily duties more effectively (Foley et al., 2003). This suggests that land-based exercise, particularly yoga, may reduce pain and sleep disturbances in patients with knee osteoarthritis. However, it may have no effect on quality of life or BMI (Cheung et al., 2014). According to the evidence collected, land-based exercise has a positive impact on quality of life. And then, Exercise may include strength training, range of motion exercises, and aerobic activity. Education and home exercises are also often part of an exercise intervention (Jansen et al., 2011). So this



can postpone the onset of knee OA and slow its progression. This suggests that an exercise-based approach would be an appropriate intervention for people suffering from KOA pain (Buckner et al., 2013). This refers to the findings in table 2 (Article Research Results) on various exercises that improve functional abilities and quality of life for people with KOA.

## CONCLUSION

In conclusion, this systematic review contributes insights on the effects of various land-based exercise interventions (Yoga, Specific Exercise, Tai Ji, Wuqinxi Exercise) on patients with knee osteoarthritis as measured by WOMAC. These findings emphasize the importance of tailoring exercise programs to each patient's specific needs and goals when it comes to managing knee osteoarthritis and improving quality of life. Furthermore, the results of land-based exercise explained above show that it can reduce pain, knee joint stiffness, and improve functional, though the change in WOMAC score is not statistically significant.

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