**KESANS: International Journal of Health and Science**
**2808-7178 / 2808-7380**
http://kesans.rifainstitute.com/index.php/kesans/index

# Comparative Effectiveness of Exercise-Based Interventions on Pain and Physical Function in Knee Osteoarthritis: A Narrative Review of Recent Evidence Syntheses

**[1]Novin Tri Wahyuni*, [2]Ummi Kalsum, [3]Humaryanto, [4]Guspianto**
[1]Master of Public Health Study Program, Faculty of Medicine and Health Sciences, Universitas Jambi, Indonesia*; email: novintrwhyn@gmail.com
[2]Master of Public Health Study Program, Faculty of Medicine and Health Sciences, Universitas Jambi, Indonesia
[3]Faculty of Medicine and Health Sciences, Universitas Jambi, Indonesia
[4] Universitas Jambi, Indonesia
*Corresponding

**Article Information**
*Submitted:* **15 June 2026**
*Accepted:* **02 July 2026**
*Publish:* **05 July 2026**

**Keyword:** Exercise Therapy; Knee Osteoarthritis; Pain; Physical Function; Systematic Review;



***Abstract***
***Introduction:*** *Knee osteoarthritis (KOA) is a leading cause of pain and disability among older adults, with exercise-based therapy widely recommended as first-line management. However, findings vary considerably across intervention types, comparators, and outcome measures.* ***Objective:*** *To synthesize and compare recent high-quality evidence regarding the effectiveness of Pilates, traditional Chinese exercise, and multi-modal physiotherapy on pain and physical function in KOA patients.* ***Methods:*** *A narrative synthesis was conducted using three recent evidence sources: a 2025 meta-analysis of Pilates exercise (11 RCTs, n=476), a 2023 meta-analysis of traditional Chinese exercise (17 RCTs, n=1,174), and the MOA Trial evaluating manual and exercise physiotherapy (n=206). Primary outcomes were pain (VAS, NPRS) and physical function (WOMAC)* ***Results and Discussion:*** *Pilates reduced pain versus no intervention (SMD −1.09; 95% CI −2.04 to −0.14) but showed no significant superiority over conventional exercise. Traditional Chinese exercise improved WOMAC pain, stiffness, and function compared with controls, with Tai Chi demonstrating the most consistent benefit. In the MOA Trial, manual physiotherapy produced the greatest WOMAC reduction (−28.5 points; 95% CI −47.8 to −9.2)* ***Conclusion:*** *All three modalities provided modest benefits, though evidence certainty ranged from very low to moderate with substantial heterogeneity. Individualized exercise prescription based on patient preference and access to supervised therapy is recommended over a single universal approach*

How to Cite **Novin Tri Wahyuni, Ummi Kalsum, Humaryanto, Guspianto/Comparative Effectiveness of Exercise-Based Interventions on Pain and Physical Function in Knee Osteoarthritis: A Narrative Review of Recent Evidence Syntheses/Vol. 5, No. 9, 2026**
DOI https://doi.org/10.54543/kesans.v5i9.673
e-ISSN/p-ISSN **2808-7178 / 2808-7380**
Published by **CV. Rifainstitut/KESANS: International Journal of Health and Science**

## Introduction

Knee osteoarthritis (KOA) is the most common chronic joint disease, characterized by cartilage degeneration, synovial inflammation, and periarticular bone changes that result in pain, stiffness, and reduced physical function (Khosim & Rahmanto, 2025); (Fadhil, Rizqillah, Naufal, & Sudaryanto, 2024). The global prevalence of KOA among individuals aged 40 years and over is estimated at 22.9%, affecting approximately 654 million people worldwide. In addition to its substantial impact on quality of life, KOA imposes a considerable economic burden, with annual direct healthcare costs in the United States alone exceeding 185 billion US dollars (de Oliveira et al., 2025); (ISLAMY & Mainitasari, 2025)

Clinical practice guidelines consistently recommend exercise therapy as a core, first-line, non-pharmacological intervention for KOA, alongside patient education and weight management (Gibbs et al., 2023). However, "exercise therapy" encompasses a wide range of modalities, including aerobic exercise, resistance training, neuromuscular exercise, Pilates, traditional Chinese exercises such as Tai Chi and Baduanjin, and multi-modal physiotherapy combining exercise with manual techniques. Each modality differs in theoretical mechanism, intensity, supervision requirements, and the outcomes it most directly targets (Holden et al., 2023); (Zhang et al., 2023)

Pain, typically assessed using the Visual Analog Scale (VAS) or Numeric Pain Rating Scale (NPRS), and physical function, most commonly assessed using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), remain the two primary patient-centered outcomes in KOA research (Cui et al., 2020). A large individual participant data meta-analysis published in 2023 found that therapeutic exercise produces a small overall effect on pain and physical function compared with non-exercise controls, though the clinical importance of this effect was considered questionable, particularly over the medium and long term (Wijanarko & Wahyuni, 2026). This finding is important because it provides a broad comparative benchmark: while exercise therapy is consistently recommended, the magnitude and clinical relevance of its benefits may vary depending on the type of exercise, delivery format, supervision, adherence, and patient characteristics (Zain et al., 2025). Therefore, modality-specific evidence should be interpreted not only in terms of statistical significance, but also in relation to whether it offers clinically meaningful advantages beyond the small average effects reported in broader exercise meta-analyses.

Given the breadth of exercise modalities studied and the variability in reported effect sizes, clinicians and patients may benefit from a comparative overview that combines broad evidence with modality-specific findings. This narrative review therefore uses the 2023 individual participant data meta-analysis as an overarching reference point for the general effectiveness of therapeutic exercise, and then compares three recent, methodologically relevant evidence sources: a 2025 systematic review and meta-analysis of Pilates exercise, a 2023 systematic review and meta-analysis of traditional Chinese exercise, and a randomized controlled trial of manual and exercise physiotherapy. By positioning the broader meta-analysis as a benchmark and the three selected studies as modality-specific examples, this review aims to clarify whether particular exercise approaches show more favorable effects on pain and physical function in patients with KOA, and whether these effects appear clinically meaningful when compared with the modest overall benefits reported for exercise therapy in general.

## Methods

This article uses a narrative review approach rather than a de novo systematic review or meta-analysis. The narrative approach was chosen because the topic of exercise therapy for KOA pain and function has recently been addressed by several high-quality systematic reviews and meta-analyses, including a Cochrane review, an individual participant data meta-analysis published in The Lancet Rheumatology (3), and modality-specific meta-analyses. Conducting an additional de novo meta-analysis on largely overlapping primary studies would risk substantial data redundancy. Instead, this review synthesizes and compares findings across recent, complementary evidence sources to provide a comparative perspective for clinicians.

Three evidence sources were selected for comparison based on recency, methodological quality, and complementary focus on different exercise modalities relevant to KOA management:

1. A 2025 systematic review and meta-analysis evaluating the effect of Pilates exercise on pain, physical function, and other health-related outcomes in patients with KOA, registered in PROSPERO (CRD42024532727), including 11 randomized controlled trials (476 participants), of which 7 contributed to quantitative synthesis
2. A 2023 systematic review and meta-analysis evaluating the efficacy of traditional Chinese exercises (Tai Chi/Taijiquan, Baduanjin, Yijinjing, and Wuqinxi) for KOA pain and disability, registered with INPLASY (INPLASY202240154), including 17 randomized controlled trials (1,174 participants)
3. The Management of OsteoArthritis (MOA) Trial, a 2 × 2 factorial randomized controlled trial (n=206) evaluating manual physiotherapy and/or exercise physiotherapy in addition to usual care for hip or knee osteoarthritis, with 1-year follow-up of the WOMAC index

For each source, the following data were extracted: study design, sample characteristics, intervention and comparator descriptions, outcome measures, principal effect estimates with 95% confidence intervals, heterogeneity ($I^2$) where reported, and certainty/quality of evidence ratings where available (e.g., GRADE). Effect sizes were reported as standardized mean differences (SMD) for the Pilates and traditional Chinese exercise meta-analyses, and as mean differences in WOMAC points for the MOA Trial, consistent with how each original source reported its results. No new pooling or statistical synthesis across sources was performed, given differences in populations, comparators, and outcome scales; findings are instead presented and discussed comparatively in narrative and tabular form.

## Results and Discussion

### 1. Result

### Overview of Included Evidence Sources

**Table 1**

Summarizes the design, population, intervention, and comparator characteristics of the three evidence sources included in this review

| Characteristic | Oliveira et al., 2025 (Pilates) | Zhang et al., 2023 (Traditional Chinese Exercise) | Abbott et al., 2013 (MOA Trial) |
|---|---|---|---|
| Design | Systematic review and meta-analysis (PROSPERO CRD42024532727) | Systematic review and meta-analysis (INPLASY202240154) | 2×2 factorial RCT, 1-year follow-up |
| Included studies / participants | 11 RCTs; n=476 (7 RCTs; n=276 in meta-analysis) | 17 RCTs; n=1,174 | n=206 (knee n=113, hip n=93) |
| Intervention(s) | Pilates (mat or apparatus-based, 6–10 weeks, 2–3×/week) | Taijiquan, Baduanjin, Yijinjing, Wuqinxi (4–24 weeks) | Manual physiotherapy; multi-modal exercise physiotherapy; combined |
| Comparator(s) | No intervention; conventional exercise | No intervention, health education, physical therapy, stretching, resistance training | Usual care only |
| Outcome measures | Pain (various scales), WOMAC, ROM, balance, QoL (SF-36) | WOMAC pain, stiffness, physical function | WOMAC composite, TUG, 30-s sit-to-stand, 40 m walk |
| Certainty of evidence | Very low to low (GRADE) | Not formally graded; high heterogeneity noted | Single RCT; not graded |

*Table 1. Comparison of design and population characteristics across the three evidence sources.*

### Effects on Pain

In the Pilates meta-analysis, three RCTs (n=66) showed that Pilates reduced pain compared with no intervention, with a large effect size (SMD -1.09; 95% CI -2.04 to -0.14; $I^2$=66%; p=0.02), though the certainty of evidence was rated low. However, when compared with conventional exercise, five RCTs (n=210) showed no significant difference in pain reduction (SMD -0.28; 95% CI -1.06 to 0.50; $I^2$=86%; p=0.49), with very low certainty of evidence

In the traditional Chinese exercise meta-analysis, the pooled analysis of 17 RCTs (n=1,174) showed a significant improvement in WOMAC pain score for the traditional Chinese exercise group compared with controls (SMD -0.31; 95% CI -0.52 to -0.10; p=0.004; $I^2$=64%). Subgroup analysis indicated that this overall effect was driven primarily by Taijiquan (Tai Chi) (SMD -0.51; 95% CI -0.89 to -0.13; p=0.008), while Baduanjin (SMD -0.13; 95% CI -0.39 to 0.13; p=0.33) and the Yijinjing/Wuqinxi group (SMD -0.05; 95% CI -0.30 to 0.20; p=0.71) showed no significant difference from controls

In the MOA Trial, pain was assessed as part of the WOMAC composite score and as a separate 0–10 intensity score. Among participants without joint replacement surgery during follow-up, all three active intervention groups (manual therapy, exercise therapy, and combined therapy) showed greater improvement in WOMAC scores at 1 year compared with usual care alone, with the largest reduction observed for manual physiotherapy (mean reduction 31.9 points; 95% CI 16.2 to 47.7)

**Effects on Physical Function**

For WOMAC-assessed knee health/function, the Pilates meta-analysis found no significant difference between Pilates and conventional exercise (SMD -0.14; 95% CI -1.12 to 0.85; $I^2$=91%; p=0.78; 4 studies; n=202), with very low certainty of evidence. Pilates did, however, show a large and statistically significant improvement in knee range of motion compared with conventional exercise (SMD 1.07; 95% CI 0.56 to 1.57; $I^2$=0%; p=0.0001; 2 studies; n=70)

The traditional Chinese exercise meta-analysis found a significant improvement in WOMAC physical function score for the intervention group compared with controls (SMD -0.38; 95% CI -0.61 to -0.15; p=0.001; $I^2$=70%) (4). Subgroup analysis showed that both Taijiquan (SMD -0.43; 95% CI -0.79 to -0.07; p=0.02) and Baduanjin (SMD -0.52; 95% CI -0.97 to -0.07; p=0.02) were associated with significant improvement, while the Yijinjing/Wuqinxi group was not (SMD -0.17; 95% CI -0.64 to 0.31; p=0.49)

In the MOA Trial, physical performance outcomes (timed up-and-go, 30-second sit-to-stand, 40 m self-paced walk) consistently favored the exercise physiotherapy group, whereas the primary patient-reported WOMAC outcome showed the largest gains for manual physiotherapy. The authors noted that self-reported and performance-based measures of function may capture different constructs, supporting the use of both types of outcome in KOA research

**Summary of Comparative Findings**

**Table 2**

Summarizes the principal effect estimates for pain and physical function across the three evidence sources.

| Outcome / Comparison | Effect Estimate (95% CI) | Heterogeneity ($I^2$) | Certainty of Evidence |
|---|---|---|---|
| Pilates vs. No Intervention: Pain | SMD -1.09 (-2.04 to -0.14) | 66% | Low |
| Pilates vs. Conventional Exercise: Pain | SMD -0.28 (-1.06 to 0.50) | 86% | Very low |
| Pilates vs. Conventional Exercise: WOMAC | SMD -0.14 (-1.12 to 0.85) | 91% | Very low |
| Traditional Chinese Exercise vs. Control: WOMAC Pain | SMD -0.31 (-0.52 to -0.10) | 64% | Not graded |
| Traditional Chinese Exercise vs. Control: WOMAC Stiffness | SMD -0.63 (-1.01 to -0.25) | 85% | Not graded |
| Traditional Chinese Exercise vs. Control: WOMAC Function | SMD -0.38 (-0.61 to -0.15) | 70% | Not graded |
| Manual Therapy + Usual Care vs. Usual Care: WOMAC (1 Year) | -28.5 points (-47.8 to -9.2)* | N/A (single RCT) | Not graded |
| Exercise Therapy + Usual Care vs. Usual Care: WOMAC (1 Year) | -16.4 points (-35.9 to 3.2)* | N/A (single RCT) | Not graded |

*Table 2. Comparative summary of principal effect estimates for pain and physical function. SMD: standardized mean difference; CI: confidence interval; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index. *Adjusted mean difference in WOMAC score (0–240 scale, lower = better) at 1 year, intention-to-treat analysis, all participants (8). Negative values indicate greater improvement relative to comparator.*

## 2. Discussion

This narrative review compared findings from four recent, methodologically robust evidence sources examining the effects of exercise-based interventions on pain and physical function in patients with KOA. In response to the need for a stronger comparative framework, the 2023 Lancet Rheumatology individual participant data meta-analysis is positioned not only as background evidence, but also as an overarching benchmark source against which modality-specific findings are interpreted. Taken together, the findings suggest that exercise-based interventions, whether Pilates, traditional Chinese exercise, multi-modal physiotherapy, or therapeutic exercise in general, are generally associated with improvements in pain and/or physical function compared with no intervention or usual care, but the magnitude, consistency, and certainty of these effects vary considerably depending on the modality, comparator, and outcome assessed.

A consistent pattern across all four sources is that exercise-based interventions tend to show clearer benefit when compared with no intervention or usual care than when compared with another active exercise modality. For instance, Pilates showed a large effect on pain versus no intervention (SMD -1.09) but no significant advantage over conventional exercise (SMD -0.28). Similarly, in the MOA Trial, all three active interventions improved WOMAC scores relative to usual care, but the trial was not designed to demonstrate superiority of one active modality over another, and the combination of manual and exercise therapy was, counterintuitively, less effective than either intervention alone, possibly because participants in the combined group received less time on each individual component. As the broadest source of comparative interpretation, the 2023 Lancet Rheumatology individual participant data meta-analysis found that therapeutic exercise produces only a small overall effect on pain and function compared with non-exercise controls, of questionable clinical importance in the medium to long term. Therefore, the modality-specific effects reported in Pilates, traditional Chinese exercise, and physiotherapy studies should be interpreted against this broader estimate, rather than treated as isolated evidence. This framing also clarifies why the selected sources are complementary: the IPD meta-analysis provides the general effect size for exercise therapy, while the three additional sources provide more specific insight into particular exercise modalities.

The traditional Chinese exercise meta-analysis provides a useful illustration of how exercise modality matters within a broader category. While the pooled effect of traditional Chinese exercise on WOMAC pain, stiffness, and function was statistically significant, subgroup analysis revealed that this effect was driven primarily by Taijiquan (Tai Chi), with Baduanjin, Yijinjing, and Wuqinxi showing inconsistent or non-significant effects. This heterogeneity at the subgroup level mirrors the heterogeneity observed between Pilates and conventional exercise, and underscores that broad categorical labels such as “exercise therapy” may obscure clinically meaningful differences between specific protocols.

Beyond statistical significance, the clinical relevance of these findings should be judged using minimum clinically important difference (MCID) thresholds. For pain outcomes measured using VAS or NPRS, an improvement of approximately 1.5–2.0 points on a 0–10 scale, or about 15–20 mm on a 100-mm VAS, is commonly considered clinically meaningful. For WOMAC outcomes, clinically meaningful improvement is often interpreted as approximately 9–12 points, or around 12% improvement, depending on the scoring format used. This distinction is important because statistically significant changes, particularly in large meta-analyses, may not necessarily translate into improvements that patients perceive as meaningful in daily activities. Thus, although Pilates, Tai Chi, and physiotherapy interventions may demonstrate favorable statistical effects, their practical value should be assessed by whether changes in VAS/NPRS and WOMAC exceed these MCID thresholds.

High statistical heterogeneity ($I^2$ ranging from 64% to 91%) was a recurring feature across the Pilates and traditional Chinese exercise meta-analyses, and the certainty of evidence for most comparisons was rated very low to low using GRADE criteria in the Pilates review. Contributing factors likely include variation in intervention duration and frequency (ranging from 4 to 24 weeks across studies), differences in comparator interventions (ranging from no intervention to active conventional exercise programs), small sample sizes (most individual studies below the optimal information size), and risk of bias related to lack of blinding of outcome assessors for inherently subjective outcomes such as pain. These methodological limitations are consistent with broader critiques of the KOA exercise literature, which has been characterized by numerous small trials with heterogeneous protocols rather than larger, well-powered, standardized trials. When interpreted alongside MCID thresholds, these limitations suggest that the apparent statistical superiority of some modalities should be viewed cautiously unless the absolute changes in pain and WOMAC scores clearly exceed clinically meaningful cut-off points.

From a clinical perspective, these findings suggest that no single exercise modality can currently be recommended as universally superior for KOA. Instead, the choice of exercise modality may reasonably be guided by patient preference, baseline mobility and functional status, access to supervised therapy, and tolerability. For example, Pilates may be a suitable lower-impact alternative for patients with mechanical restrictions or difficulty adhering to traditional strengthening programs, given its demonstrated benefit on range of motion and balance. Tai Chi may be particularly suitable for older adults seeking a low-to-moderate intensity, group-based modality with mind-body components. Multi-modal physiotherapy combining individualized exercise prescription with manual therapy, as in the MOA Trial, may offer the most comprehensive approach where supervised physiotherapy services are accessible, though the optimal combination and sequencing of manual and exercise components requires further investigation. However, clinical recommendation should not rely solely on whether an intervention is statistically superior to usual care. It should also consider whether the observed reduction in pain reaches the MCID for VAS/NPRS and whether improvement in physical function reaches the MCID for WOMAC. This patient-centered interpretation is essential because a small average effect may still be meaningful for selected patients, while a statistically significant pooled effect may be insufficient for others.

This review has several limitations inherent to its narrative design. First, it does not represent an exhaustive or systematic search of the literature; rather, it draws on four purposively selected evidence sources, consisting of one broad IPD meta-analysis as a benchmark and three modality-specific studies or reviews. Second, no new statistical

pooling was performed across sources, given differences in populations, comparators, and outcome scales; consequently, this review cannot provide a single overall effect estimate for "exercise therapy" as a category. Third, the included sources themselves carry their own limitations, including high heterogeneity, predominance of short-term follow-up, and very low to low certainty of evidence for several comparisons. Fourth, differences in outcome reporting across studies limited direct comparison against MCID thresholds, particularly when results were presented as standardized mean differences rather than absolute changes in VAS, NPRS, or WOMAC scores. Future research should prioritize larger, adequately powered randomized controlled trials with standardized outcome reporting, longer follow-up periods, and head-to-head comparisons between specific exercise modalities, while consistently reporting absolute score changes and the proportion of patients achieving MCID, to enable more definitive comparative conclusions and, ultimately, more precise clinical recommendations.

## Conclusion

Based on a comparative narrative synthesis of three recent evidence sources, exercise-based interventions, including Pilates, traditional Chinese exercise (particularly Tai Chi), and multi-modal physiotherapy, are associated with improvements in pain and/or physical function among patients with knee osteoarthritis, particularly when compared with no intervention or usual care alone. However, the certainty of evidence ranges from very low to moderate, heterogeneity across studies remains substantial, and no single modality has demonstrated clear superiority over the others. Clinical decision-making regarding exercise prescription for knee osteoarthritis should therefore be individualized, taking into account patient preference, functional status, and access to supervised therapy, while future large-scale, standardized trials are needed to strengthen the evidence base.

## Reference

Cui, Aiyong, Li, Huizi, Wang, Dawei, Zhong, Junlong, Chen, Yufeng, & Lu, Huading. (2020). Global, regional prevalence, incidence and risk factors of knee osteoarthritis in population-based studies. *EClinicalMedicine*, *29*.

de Oliveira, Tulio Medina Dutra, Felicio, Diogo Carvalho, Filho, Jose Elias, Castro, Rayane Quintao, Gomides, Fernando Junior da Silva, Pires, Luis Felipe Petronilho, Fonseca, Diogo Simoes, & Malaguti, Carla. (2025). Effect of Pilates Exercise on Health Related Outcomes in Patients With Knee Osteoarthritis: A Systematic Review and Meta Analysis. *International Journal of Rheumatic Diseases*, *28*(10), e70434.

Fadhil, Adnan Rizqy, Rizqillah, Indah Prima, Naufal, Adnan Faris, & Sudaryanto, Wahyu Tri. (2024). Penyuluhan Osteoarthritis Pada Komunitas Lansia Di Panti Lansia Sentra Terpadu Surakarta. *Jurnal Pengabdian Masyarakat Bangsa*, *2*(8), 3407–3413.

Gibbs, Alison J., Gray, Bimbi, Wallis, Jason A., Taylor, Nicholas F., Kemp, Joanne L., Hunter, David J., & Barton, Christian J. (2023). Recommendations for the management of hip and knee osteoarthritis: a systematic review of clinical practice guidelines. *Osteoarthritis and Cartilage*, *31*(10), 1280–1292.

Holden, Melanie A., Hattle, Miriam, Runhaar, Jos, Riley, Richard D., Healey, Emma L., Quicke, Jonathan, van der Windt, Danielle A., Dziedzic, Krysia, van Middelkoop, Marienke, & Burke, Danielle. (2023). Moderators of the effect of therapeutic exercise for knee and hip osteoarthritis: a systematic review and individual participant data meta-analysis. *The Lancet Rheumatology*, *5*(7), e386–e400.

ISLAMY, AESTHETICA, & Mainitasari, Asesia Cipta. (2025). PENGARUH KNEE OSTEOARTHRITIS EXERCISE THERAPY TERHADAP PENURUNAN NYERI LUTUT LANSIA: THE EFFECT OF KNEE OSTEOARTHRITIS EXERCISE THERAPY ON REDUCING KNEE PAIN IN THE ELDERLY. *Jurnal Ilmiah Pamenang*, *7*(2), 178–184.

Khosim, Akhmad, & Rahmanto, Safun. (2025). Penyuluhan Osteoarthritis Lutut pada Kelompok Lansia Desa Laweyan Probolinggo. *Jurnal Pengabdian Masyarakat Bangsa*, *3*(10), 5167–5171.

Wijanarko, Satrio Budhi, & Wahyuni, S. (2026). *Pengaruh Hydrotherapy Untuk Mengatasi Keluhan Nyeri, Kemampuan Fungsional, Dan Kualitas Hidup Osteoarthritis Genu: Narrative Literature Review*.

Zain, Siti Azzura, Razzaq, Aliyah Nadhifah, Indraprastha, Annya Shakty, Salsabila, Anida Nasywa, Wicaksono, Septian Tri, Pahlavi, Arjuna Fatkhur Roziq, Pristianto, Arif, & Munawar, Munawar. (2025). Efektivitas Intervensi Fisioterapi dalam Mengurangi Nyeri dan Meningkatkan ROM pada Lansia Penderita Osteoarthtritis Genu di RST. Soedjono Magelang. *Inovasi Kesehatan Global*, *2*(4), 155–165.

Zhang, Shuaipan, Huang, Ruixin, Guo, Guangxin, Kong, Lingjun, Li, Jianhua, Zhu, Qingguang, & Fang, Min. (2023). Efficacy of traditional Chinese exercise for the treatment of pain and disability on knee osteoarthritis patients: a systematic review and meta-analysis of randomized controlled trials. *Frontiers in Public Health*, *11*, 1168167.