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ORIGINAL

THE EFFECT OF TRADITIONAL CHINESE MEDICINE QUADRUPLE TREATMENTS ON ARTHRITIS OF THE KNEE CAUSED BY EXERCISE

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ABSTRACT

Objective: To observe the clinical effect of quadruple therapy of traditional Chinese medicine in the treatment of motor arthritis, and to provide reference for the treatment of patients. **Methods:** A total of 97 patients with exercise-induced arthritis admitted to our hospital from January 2021 to October 2022 were selected as research objects, and were randomly divided into control group (n=47) and experimental group (n=50). The control group received four treatments of Western medicine to reduce swelling and strengthen muscles, and the experimental group received four treatments of traditional Chinese medicine, including panax notoginseng analgesic ointment, moxibustion, strength and elastic strength training treatment. Pain, 60° flexion and extension ratio, average trajectory difference were used as observation indexes to observe and compare the clinical efficacy, knee joint index, knee joint function, safety and so on. **Results:** There were no significant differences in gender, age, BMI, course of disease, Kellgren-1awrence grade, lesion site and other basic data between the two groups. After treatment, the total effective rate of the experimental group was 96.00%, significantly higher than that of the control group (72.34%) (P<0.05). After treatment, VAS, 60° flexion extension ratio and average trajectory difference of the two groups were decreased compared with before treatment, and VAS, 60° flexion extension ratio and average trajectory difference of the experimental group were significantly lower than those of the control group (P <0.05). After treatment, the scores of joint function, joint pain and stiffness of the two groups were decreased compared with those before treatment, and the scores of joint function, joint pain and stiffness of the experimental group were significantly lower than those of the control group (P <0.05). The incidence of adverse events in the experimental group was 2.00%

significantly lower than 6.38% in the control group (P<0.05). No cardiovascular disease or arrhythmia occurred in the two groups during treatment, and all patients were cured without treatment after the occurrence of adverse reactions. **Conclusion:** Compared with the widely used Western medicine, the quadruple therapy of Chinese medicine can improve the stability of the knee joint to the same extent. In addition, the operation of the quadruple therapy of Chinese medicine is simpler, and it is worth promoting vigorously.

KEYWORDS: quadruple therapy; Traditional Chinese medicine; Clinical effect; Motor arthritis

1. INTRODUCTION

As a common orthopedic joint disease, the incidence of exercise-induced arthritis increases year by year with the change of sociodemographic structure, and the prevalence in the middle-aged and elderly population is as high as 33%, of which the prevalence in the people over 60 years of age is as high as 70%, and more than 90% of the 80-year-old population is accompanied by significant clinical symptoms, which has achieved widespread clinical attention (Hsu et al., 2018; Stouten et al., 2021). The disease usually shows symptoms such as swelling, deformity, pain, stiffness and limited mobility around the knee joint, and gradually shows limb dysfunction and claudication with the progression of the disease, which seriously affects their daily life (Cook, Lunt, Verstappen, & O'Neill, 2021). The etiology and pathogenesis of motor arthritis are not clear, there is a lack of specific drug treatment, and surgical treatment and conservative treatment are mostly given according to its disease severity and clinical symptoms, and the overall treatment effect is limited, and it cannot delay disease progression (Bowman, Hallock, Throckmorton, & Azar, 2018; Wang, Chen, Shih, Yen, & Lin, 2021). Therefore, it is important to select appropriate and effective treatment options for patients with exercise-induced arthritis.According to TCM (Woon, Chia, Kwan, Phang, & Fong, 2021; Yang, Peng, Adams, & Sibbritt, 2018), exercise-induced arthritis belongs to the category of "Bi Zheng" and "Knee Bi", and its etiology is divided into internal and external causes, internal because of liver and kidney deficiency, qi and blood decline, poor tendons and veins, and reduced kidney deficiency marrow, external because wind evil dampness and cold into the body, qi and blood stasis, and occlusion of meridian joints, it leads to knee swelling and pain, and it is necessary to design a treatment plan for warming meridians to relieve pain, strengthening muscles and bones, and tonifying qi and nourishing the kidney based on the principle of muscle and bone disease. At present, scholars mainly focus on the study of sports arthritis combined with traditional Chinese and western medicine, a variety of treatment methods combined with other means, but the application of traditional Chinese medicine quadruple therapy in sports arthritis research is still rare (Tian et al., 2019; Xing, Fu, Yu, & Zhou, 2020). In view of the above problems, 97 patients with exercise-induced arthritis admitted

to our hospital from January 2021 to October 2022 were selected as the study subjects and given western medicine quadruple therapy and traditional Chinese medicine quadruple therapy intervention to implement a controlled study in order to explore the therapeutic effect of traditional Chinese medicine quadruple therapy on exercise-induced arthritis. It is reported as follows.

2. Material and methods

2.1 General material

A total of 97 case of exercise-induced arthritis patients who were treat in our hospital from January 2021 to October 2022 were selected as that research subjects and randomly divide into a control group (n=47) and an experimental group (n=50) according to the method of random grouping. there was no significant difference in general data such as gender and age between the two groups (P >0.05), indicating comparability. The control group was treated with western medicine quadruple therapy for detumescence and muscle strengthening, while the experimental group was given the intervention of traditional Chinese medicine quadruple therapy, including Sanqi Xiaotong Ointment, moxibustion and the use of strength and elastic strength training. This study was approved by the Medical Ethics Committee of our hospital (Gandhi, Robert, Palacios, & Chan, 2022).

2.2 Criteria of inclusion and exclusion

Inclusion criteria: ① Patients who met the diagnostic criteria of the American College of Rheumatology (Hochberg, 2011) for athletic arthritis; ② The TCM syndrome differentiation criteria met the diagnostic criteria for athletic arthritis in the Guiding Principles for Clinical Research on New Drugs of Traditional Chinese Medicine (Xia et al., 2020); ③ The diagnosis of motor arthritis is confirmed through X-ray and pathological examination of the knee joint; ④ Patients aged 40–75 years old, with Kellgren-1awrence classification of grade 1–3; ⑤ Patients without cognitive or mental disorders and with normal communication; ⑥ All the subjects and relatives knew the content of the study and signed the informed consent form voluntarily.

Exclusion criteria: ① Patients with severe impairment of heart, liver, kidney and other functions or malignant tumor; ② Patients with severe knee deformity, stenosis, ankylosis, and a large number of osteophytes; ③ Patients with knee joint fracture, infection, meniscus injury, and gout; ④ Patients who were allergic to drugs used in this study; ⑤ Patients with coagulation function, autoimmune system diseases; ⑥ Patients with poor compliance.

2.3 Research methods

All patients filled in basic information after admission and received health

education, psychological care and other measures. The control group received western medicine quadruple therapy for detumescence and muscle strengthening, mainly including massage, electromagnetic wave irradiation, joint mobilization, limb rehabilitation training and so on. Massage is to apply diclofenac diethylamine latex (Beijing Novartis Pharmaceutical Co., Ltd., GYZZ H19990291) to the affected knee joint and slowly massage the iliotibial band, hamstring muscle, gastrocnemius muscle, semitendinosus muscle, abductor muscle and other muscle groups around the knee joint to absorb, once a day; electromagnetic wave irradiation is mainly through specific electromagnetic waves to irradiate the affected side, pay attention to temperature, distance, etc., to avoid high fever and scalded skin, lasting about 15 to 30 minutes, once a day; joint mobilization is mainly based on the degree and direction of activity limitation to implement traction on the affected joint, lateral sliding, sliding up and down, sliding back and forth, pay attention to joint flexion and extension, rotation, etc., the strength is tolerable, lasting about 15 to 20 minutes, once a day; limb rehabilitation training: guide them to supine, prone and other training of their limb muscle strength, according to their tolerance to guide them to receive patellofemoral joint training, knee flexion and extension training, 10 times a day, 20 to 30 minutes each time, once a day.

The experimental group received TCM quadruple therapy intervention, including Sanqi Xiaotong ointment, moxibustion, and the use of strength and elastic strength training treatment.① Place Panax notoginseng Xiaotong ointment on the affected skin and muscle groups according to application or massage manipulation, and slowly massage to absorption, 2 ~ 3 times a day; ② Moxibustion: Referring to the acupoint selection in Acupuncture and Moxibustion Therapeutics (Lewis, 2011), the selected acupoints are internal and external knee eye points, Zusanli, Sanyinjiao points, Yinlingquan, Taixi points, Xuehai points, Yanglingquan points, etc. After igniting the moxa stick, focus on moxibustion on the above acupoints, which can be combined with massage at Chengshan points and Weizhong points, pay attention to moxibustion using circumflex moxibustion manipulation at each acupoint, control moxibustion temperature to avoid scalding the skin, lasting for about 15 minutes, once a day.③ Strength and elastic strength training were used, in which the patellar ligament training finger guided the patient to lie supine and the popliteal fossa was padded with a pillow to guide his knee joint and upper tibiofibular joint to do different directions of extension movement, and the fingers were used to rest the patella and patellar tendon for lateral and up and down sliding, 10 times in each group; the quadriceps femoris muscle strength training finger guided the patient to lie supine, the lower leg bent, the fingers pressed the hamstring muscle along the gluteal transverse striae to the gastrocnemius muscle, bent to the buttock when bending to the heel, pressed his semitendinosus muscle, hemimembranosus muscle, etc., and gradually expanded to bend the knee joint, 8 times in each group; the knee bending and extension training finger guided his elastic band muscle strength training, etc.,

once a day according to his tolerance.Patients in both groups continued treatment for 2 weeks.

2.4 Observational index

① Clinical effect: The clinical treatment effect was evaluated according to the Lequesne index (Wei, Yang, Changqing, Khattab, & Mokhtari, 2019), and the significant ones were as follows: the change value of Lequesne index score was ≥75%, and the knee joint pain and intraosseous pressure were significantly improved; The effective Lequesne index score ranged from 30% to 75%, and the knee joint pain and intraosseous pressure were improved (Sung & Wu, 2018). The ineffective ones were the change value of Lequesne index score < 30%, and no change or even aggravation of knee joint pain, intraosseous pressure, etc. Total effective rate = (number of cases with remarkable effect+effective effect)/total number of cases ×100%.

② Knee joint indicators, including pain severity, 60 flexion-extension ratio, and mean trajectory difference. The visual analog scale (VAS) was used to measure the pain severity before and after the intervention and the 0–10 cm ruler was used for evaluation. The numbers from "0" to "10" indicated "no pain" to "strong pain", with a score of < 1 indicating no pain, 1–3 indicating slight pain, 4–7 indicating moderate pain, and 8–10 indicating severe pain. The scores were positively correlated with the pain severity. 60 flexion-extension ratio The maximum muscle strength ratio of the 60 flexion and extension of the knee joints on the affected side and the healthy side was detected by the simulation strength training and evaluation system, and the average value was obtained after three tests. The average trajectory difference was the trajectory error of controlling the lower limb circle drawing in the proprioception detected by the dynamic and static balance tester.

③ Knee joint function: The WOMAC Osteoarthritis Index (Bellamy, Wilson, & Hendrikz, 2011) score was used to assess the knee joint function before and after intervention, which included joint function, joint pain degree and stiffness degree, with the total score of 0–96. The higher the score was, the worse the knee joint function would be.

④ Safety evaluation: Follow-up for three months was conducted to observe and record the incidence of adverse events in the two groups, including headache, chest tightness, arrhythmia, and cardiovascular disease.

2.5 Statistical methods

SPSS 24.0 statistical software was used. The data conforming to the normal distribution were measured and expressed as ($\bar{x} \pm s$). The data between groups were compared with t test. Enumeration data were expressed as case number (N) and percentage (%). Intergroup comparison was performed using

χ2 test, and P <0.05 indicated that the difference had statistical significance.

3. Results

3.1 Comparison of general data

The results showed that there was no significant difference in basic data such as gender, age, BMI, course of disease, Kellgren-1awrence classification, and lesion site between the two groups (P>0.05), as shown in Table 1.

Table 1: Comparison of general data

GROUP		CONTROL GROUP （n=47）	EXPERIMENTAL GROUP （n=50）	t VALUE	P VALUE
GENDER （CASES）	Male	26（55.32）	28（56.00）	5.309	0.152
	Female	21（44.68）	22（44.00）		
AGE（years）		58.03±8.45	59.67±8.23	4.814	0.195
BMI（kg/m²）		23.86±1.29	23.89±1.31	5.389	0.248
DISEASE COURSES （years）		6.39±1.45	6.37±1.42	6.461	0.923
KELLGREN-1AWRENCE CLASSIFICATION （CASES）	Class 1	7（14.89）	9（18.00）	5.301	0.517
	Class 2	23（48.94）	24（48.00）		
	Class 3	17（36.17）	17（34.00）		
LESION SITE （CASES）	Left	18（38.30）	20（40.00）	4.298	0.562
	Right	29（61.70）	30（60.00）		

3.2 Comparison of clinical efficacy between the two groups

The results showed that the total effective rate of 96.00% in the experimental group after treatment was significantly higher than 72.34% in the control group, and the difference was statistically significant (P<0.05), as shown in Table 2.

Table 2: Comparison of clinical efficacy between the two groups (cases, %)

GROUP	Control group （n=47）	EXPERIMENTAL GROUP （n=50）	χ2 VALUE	*P* VALUE
SIGNIFICANT EFFECTIVE	15（31.91）	19（38.00）	-	-
EFFECTIVE	19（40.43）	29（58.00）	-	-
INEFFECTIVE	13（27.66）	2（4.00）	-	-
TOTAL EFFICIENCY	72.34%	96.00%	5.391	0.042

3.3 Comparison of knee joint indexes between the two groups

The results showed that there was no significant difference in knee joint indexes between the two groups before treatment (P > 0.05). After treatment, the VAS, 60° flexion-extension ratio, and average trace difference levels of the two groups were lower than those before treatment. The VAS, 60 flexion-extension ratio, and average trace difference levels of the experimental group were significantly lower than those of the control group, and the differences were statistically significant (P <0.05), as shown in Table 3.

Table 3: Comparison of knee joint indexes between the two groups（$\bar{x}$±s）

GROUP	TIME	CONTROL GROUP （n=47）	EXPERIMENTAL GROUP （n=50）
VAS （POINT）	Before treatment	6.79±1.25	6.81±1.32
	After treatment	2.53±0.64*	2.05±0.48*#
60° flexion-EXTENSION RATIO（%）	Before treatment	71.29±24.35	71.88±24.16
	After treatment	60.92±17.13*	58.39±12.89*#
AVERAGE TRACE DIFFERENCE（%）	Before treatment	50.82±24.34	50.88±25.12
	After treatment	35.38±16.72*	32.19±10.47*#

Note，*compared with before treatment，*P<0.05；compared with the control group，#P<0.05*

3.4 Comparison of knee function between the two groups

The results showed that there was no significant difference in knee joint function between the two groups before treatment (P > 0.05). After treatment, the scores of joint function, joint pain degree and stiffness degree were all lower than those before treatment. The scores of joint function, joint pain degree and stiffness degree in the experimental group were all significantly lower than those in the control group. The difference was statistically significant (P <0.05), as shown in Table 4.

Table 4: Comparison of knee function between the two groups（$\bar{x}$±s）

GROUP	TIME	CONTROL GROUP （n=47）	EXPERIMENTAL GROUP （n=50）
JOINT FUNCTION	Before treatment	22.24±2.81	22.33±2.74
	After treatment	14.82±1.35*	8.91±1.06*#
JOINT PAIN DEGREE	Before treatment	26.82±2.66	26.90±2.67
	After treatment	15.36±1.38*	8.02±0.92*#
STIFFNESS DEGREE	Before treatment	17.49±2.03	17.51±2.05
	After treatment	14.90±1.24*	7.89±1.13*#

Note，*compared with before treatment，*P<0.05；compared with the control group，#P<0.05*

3.5 Comparison of adverse event rates

The results showed that the incidence rate of adverse events in the experimental group was 2.00%, which was significantly lower than 6.38% in the control group. In addition, no cardiovascular disease or arrhythmia was observed in the two groups during the treatment period. The difference was statistically significant (P<0.05). All patients were cured without any treatment after the adverse reactions occurred, as shown in Table 5.

Table 5: Comparison of adverse event rates (cases, %)

GROUP	CONTROL GROUP （n=47）	EXPERIMENTAL GROUP （n=50）	X2 VALUE	*P* VALUE
HEADACHE	1（2.13）	0（0.00）	-	-
CHEST DISTRESS	2（4.26）	1（2.00）	-	-
ARRHYTHMIA	0（0.00）	0（0.00）	-	-
CARDIOVASCULAR DISEASE	0（0.00）	0（0.00）	-	-
INCIDENCE OF ADVERSE REACTIONS	6.38%	2.00%	4.021	0.001

4. Discussion

Athletic arthritis, as a common degenerative disease of articular cartilage among the middle-aged and elderly people, is often considered to be the interaction of factors such as overwork and abnormal anatomical structure, which promotes the imbalance of synthesis and metabolism of knee chondrocytes, osteoblasts, and osteoclasts, and leads to the abnormal arrangement of muscles and tissues of the knee joint, structural mechanical deviation, osteoarticular pain, swelling and deformity, as well as uneven stress on limbs and reduced stability, further affecting their daily life and social interaction (Peat, McCarney, & Croft, 2001).

At present, patients with athletic arthritis are mainly treated with drugs and surgical therapies according to their severity. Among the drug therapies, anti-inflammatory drugs and cytokines are used to achieve the effects of detumescence, analgesia and muscle building, but they will damage liver and kidney tissues and gastrointestinal system.

Although surgical treatment can remove the damaged joints and balance the lower limb strength, the proprioceptive organs are decreased, which will affect its subsequent stability (Jayaram, Ikpeama, Rothenberg, & Malanga, 2019; Zeng et al., 2018). With the gradual promotion and application of traditional Chinese medicine, the quadruple therapies including Sanqi Xiaotong Ointment, moxibustion, and strength and elastic strength training have

achieved significant results in the treatment of arthritis patients (Zhou, Xu, Ren, & Chen, 2020). In this study, the quadruple therapy in traditional Chinese medicine was used to intervene the patients with motor arthritis, which can significantly relieve the pain in the muscles and joints of their lower limbs, improve the stability of the body and obtain significant therapeutic effects.

During the development of motor arthritis, static rest is mainly received in the early stage due to joint pain, swelling and other symptoms, and after immobilization, due to the decrease of activity, the cross-sectional muscle strength of the tissues and muscle groups around the knee joint is reduced, the conduction velocity of motor neurons is reduced, the dynamic muscle strength of the joint is increasingly decreased, and the balance ability and walking ability of the lower limbs are decreased to varying degrees, which in turn damages the cartilage and muscle tissues of the knee joint, promoting the deterioration of the condition and affecting their daily life and work level (Boehme & Rolauffs, 2018).

Western medicine quadruple therapy through massage, electromagnetic wave irradiation, joint mobilization, limb rehabilitation training and other combined interventions, in which massage can promote knee joint tissue detumescence and analgesia, electromagnetic wave irradiation can increase local skin temperature, promote knee blood circulation, joint mobilization, limb rehabilitation training can regulate joint balance, structural mechanics, etc., improve joint stability, and then achieve a good therapeutic effect, but the selected instruments and equipment in primary hospitals is difficult to popularize, increasing the difficulty of treatment plan promotion (Van den Ende et al., 2020).

In the quadruple therapy of traditional Chinese medicine, Panax notoginseng Xiaotong ointment is repeatedly rubbed at the affected knee joint to percutaneously absorb the traditional Chinese medicine components such as Chuanwu, Honghua, and Sanqi in the ointment to the knee joint cartilage and surrounding tissues, give full play to laughter, reduce skin pain, swelling, etc., and exert the effects of eliminating coldness and removing dampness, activating blood stasis, and relieving pain; moxibustion mainly promotes the body to regulate the immune system and exert analgesic substances by stimulating the acupoints around the knee joint, reduces its pain sensitivity, and can also dredge the qi and blood meridians of the knee joint (Zhao et al., 2021), expel cold and dissipate dampness, nourish blood and invigorate the spleen; and then strength training is used to help it regulate the balance of the knee muscles and bones (Lai, Lee, Chen, & Wang, 2021), improve its proprioception, limb balance stability, and correct joint strength lines.

Guo D et al (Guo et al., 2022) used self-massage and limb rehabilitation exercises to significantly reduce the VAS score of patients with gonarthritis, relieve their arthritis swelling, dysfunction and deformity, and improve their joint

function. The study results showed that after treatment, VAS, 60 ° flexion and extension ratio and mean trajectory difference in the two groups were lower than those before treatment, VAS, 60 ° flexion and extension ratio and mean trajectory difference in the experimental group were significantly lower than those in the control group; after treatment, joint function, joint pain and stiffness scores in the two groups were lower than those before treatment, and joint function, joint pain and stiffness scores in the experimental group were significantly lower than those in the control group. It is suggested that the treatment of sports arthritis with TCM quadruple therapy can significantly reduce the degree of pain, improve the proprioception and stability of the knee joint, and improve knee joint function.

The data showed that after treatment, the overall response rate of the experimental group was significantly higher than that of the control group; the incidence of adverse events in the experimental group was significantly lower than that of the control group, and no cardiovascular disease, arrhythmia, etc. occurred during the treatment in both groups.

All patients recovered without treatment after the occurrence of adverse reactions. It shows that TCM quadruple therapy intervenes patients with exercise-induced arthritis, through Sanqi Xiaotong ointment, moxibustion, the use of strength and elastic strength training and other dynamic and static combination methods, gradually promote patients to master limb strength and strength, regulate limb qi, blood, bones and muscles, correct their joint alignment, restore soft tissue elasticity, bone tissue hardness, etc., alleviate soft tissue degeneration, promote the body 's own regulation, to achieve cold dehumidification, activate muscles and bones, detumescence and analgesia; the other selected methods can continue to operate after returning to family and society, improve treatment cooperation, self-management ability, and further enhance the therapeutic effect.

There are still shortcomings in this study, which are reflected in the small number of cases, the study data may be different from the clinical data, which will have an impact on the reliability of the experimental results; the follow-up time is short, only to explore the short-term impact on their pain level, proprioception, etc., and the efficacy; TCM quadruple therapy has not yet formed a planned and systematic operation process and program, which is difficult to popularize and apply in clinical practice. Therefore, it is necessary to expand the sample size and follow-up time to verify the feasibility of the study results and promote their clinical promotion.

In summary, the use of TCM quadruple therapy in the intervention of patients with exercise-induced arthritis can reduce their pain, joint swelling, etc., improve their knee joint stability, promote the treatment effect, safety improvement, etc., to improve their daily life level is of great significance.

References

Bellamy, N., Wilson, C., & Hendrikz, J. (2011). *Population-based normative values for the Western Ontario and McMaster (WOMAC) Osteoarthritis Index: part I.* Paper presented at the Seminars in arthritis and rheumatism.

Boehme, K. A., & Rolauffs, B. (2018). Onset and progression of human osteoarthritis—Can growth factors, inflammatory cytokines, or differential miRNA expression concomitantly induce proliferation, ECM degradation, and inflammation in articular cartilage? *International Journal of Molecular Sciences, 19*(8), 2282.

Bowman, E. N., Hallock, J. D., Throckmorton, T. W., & Azar, F. M. (2018). Hyaluronic acid injections for osteoarthritis of the knee: predictors of successful treatment. *International Orthopaedics, 42*, 733-740.

Cook, M. J., Lunt, M., Verstappen, S. M., & O'Neill, T. W. (2021). O27 Frailty and co-morbidity in people with osteoarthritis and rheumatoid arthritis. *Rheumatology, 60*(Supplement_1), keab246. 026.

Gandhi, P., Robert, M. A., Palacios, J., & Chan, D. (2022). Effects of Contact Tracing and Self-Reporting in a Network Disease Model. *Letters in Biomathematics, 9*(1), 23–39-23–39.

Guo, D., Ma, S., Zhao, Y., Dong, J., Guo, B., & Li, X. (2022). Self-administered acupressure and exercise for patients with osteoarthritis: A randomized controlled trial. *Clinical Rehabilitation, 36*(3), 350-358.

Hochberg, M. C. (2011). *Proposed 2011 American College of Rheumatology recommendations for the use of non-pharmacologic and pharmacologic therapies in osteoarthritis of the hand, hip and knee.* Paper presented at the Seminars in Arthritis and Rheumatism.

Hsu, K. Y., Tsai, Y. F., Yeh, W. L., Chen, D. W., Chen, C. Y., & Wang, Y. W. (2018). Triggers and decision-making patterns for receiving total knee arthroplasty among older adults with knee osteoarthritis: A qualitative descriptive study. *Journal of Clinical Nursing, 27*(23-24), 4373-4380.

Jayaram, P., Ikpeama, U., Rothenberg, J. B., & Malanga, G. A. (2019). Bone Marrow–Derived and Adipose-Derived Mesenchymal Stem Cell Therapy in Primary Knee Osteoarthritis: A Narrative Review. *PM&R, 11*(2), 177-191.

Lai, Z., Lee, S., Chen, Y., & Wang, L. (2021). Comparison of whole-body vibration training and quadriceps strength training on physical function and neuromuscular function of individuals with knee osteoarthritis: A randomised clinical trial. *Journal of Exercise Science & Fitness, 19*(3), 150-157.

Lewis, C. (2011). Acupuncture therapeutics. *Acupuncture in Medicine, 29*(2), 160.

Peat, G., McCarney, R., & Croft, P. (2001). Knee pain and osteoarthritis in older adults: a review of community burden and current use of primary health care. *Annals of the rheumatic diseases, 60*(2), 91.

Stouten, V., Westhovens, R., De Cock, D., Van der Elst, K., Pazmino, S., Bertrand, D., . . . Verschueren, P. (2021). Having a co-morbidity predicts worse outcome in early rheumatoid arthritis despite intensive treatment: a post hoc evaluation of the pragmatic randomized controlled CareRA trial. *Rheumatology, 60*(8), 3699-3708.

Sung, Y.-T., & Wu, J.-S. (2018). The visual analogue scale for rating, ranking and paired-comparison (VAS-RRP): a new technique for psychological measurement. *Behavior research methods, 50*, 1694-1715.

Tian, D., Sun, J., Li, J., Xie, G., Hao, S., Niu, J., . . . Zhang, Z. (2019). Protective effect of Traditional Chinese medicine Shuangwu Zhentong Capsule on collagen-induced arthritis in rats and possible mechanisms. *European Journal of Inflammation, 17*, 2058739219843402.

Van den Ende, C. H., Minten, M. J., Leseman-Hoogenboom, M. M., van den Hoogen, F. H., Den Broeder, A. A., Mahler, E. A., & Poortmans, P. M. (2020). Long-term efficacy of low-dose radiation therapy on symptoms in patients with knee and hand osteoarthritis: Follow-up results of two parallel randomised, sham-controlled trials. *The Lancet Rheumatology, 2*(1), e42-e49.

Wang, J.-W., Chen, G.-F., Shih, H.-N., Yen, S.-H., & Lin, P.-C. (2021). Total Knee Arthroplasty with Intra-Articular Resection of Bone for Knee Arthritis Secondary to Malunion of a Tibial Shaft Fracture: A Radiological Evaluation of Correction of the Tibial Deformity. *BioMed Research International, 2021*.

Wei, Z., Yang, G., Changqing, G., Khattab, I. Z. A., & Mokhtari, F. (2019). Effect of acupotomy versus electroacupuncture on ethology and morphology in a rabbit model of knee osteoarthritis. *Journal of Traditional Chinese Medicine, 39*(02), 229.

Woon, T. H., Chia, S., Kwan, Y. H., Phang, J. K., & Fong, W. (2021). Evaluation of the quality of YouTube videos on traditional Chinese medicine and inflammatory arthritis. *European Journal of Integrative Medicine, 47*, 101380.

Xia, X., May, B. H., Zhang, A. L., Guo, X., Lu, C., Xue, C. C., & Huang, Q. (2020). Chinese herbal medicines for rheumatoid arthritis: text-mining the classical literature for potentially effective natural products. *Evidence-Based Complementary and Alternative Medicine, 2020*.

Xing, Q., Fu, L., Yu, Z., & Zhou, X. (2020). Efficacy and safety of integrated traditional Chinese medicine and western medicine on the treatment of rheumatoid arthritis: a meta-analysis. *Evidence-Based Complementary and Alternative Medicine, 2020*.

Yang, L., Peng, W., Adams, J., & Sibbritt, D. W. (2018). Treating people with arthritis with traditional Chinese medicine (TCM): an examination of the perception of TCM practitioners. *Acupuncture in Medicine, 36*(4), 228-239.

Zeng, C., Wei, J., Persson, M. S., Sarmanova, A., Doherty, M., Xie, D., . . . Long,

H. (2018). Relative efficacy and safety of topical non-steroidal anti-inflammatory drugs for osteoarthritis: a systematic review and network meta-analysis of randomised controlled trials and observational studies. *British journal of sports medicine, 52*(10), 642-650.

Zhao, L., Cheng, K., Wu, F., Du, J., Chen, Y., Tan, M. T., . . . Shen, X. (2021). Effect of laser moxibustion for knee osteoarthritis: a multisite, double-blind randomized controlled trial. *The Journal of rheumatology, 48*(6), 924-932.

Zhou, X., Xu, S., Ren, Q., & Chen, J. (2020). Quality and specific concerns of clinical guidelines for integrated chinese and western medicine: a critical appraisal. *Evidence-based Complementary and Alternative Medicine: eCAM, 2020*.