

Progress of treating knee osteoarthritis with traditional Chinese medicine

Yuxin Zhan

College of physical education, Soochow University, Suzhou, 215006, China

yuxin@ldy.edu.rs

Abstract. Knee osteoarthritis is a degenerative diseases-based ailment, the primary cause is lower limb dysfunction in the elderly population, the manifestations of joint pain, swelling, stiffness, deformity, joint friction, dysfunction and other symptoms, adversely impact the patients' emotional well-being and quality of life. Chinese herbal medicine, with a long history and as a promising therapeutic, has also been gradually applied to the treatment of osteoarthritis of the knee (KOA). It is based on the conventional Chinese medical theory and its clinical application traditional Chinese medicine (TCM) treatment methods such as using TCM externally, acupuncture, massage, traditional health care, etc., is conducive to achieving significant clinical results. This article reviews the different methods of treating KOA with TCM, and probes into the function and the benefits of combining traditional Western medicine with clinical diagnosis and treatment of KOA in TCM. The results show that shadowboxing, eight trigrams boxing, tendon change classic, the Five Mimic-animal boxing and other important rehabilitation methods in traditional health care not only start from the holistic view of TCM, but also can organically combine breathing, consciousness and movement, and then improve the ability of human motor system through multi-functional exercise. In addition, integrative medicine has positive and effective effect on the treatment of KOA. Different patients should choose the appropriate way to intervene individually. In the future, clinical research efforts should be further strengthened to improve the quality of evidence-based evidence, so as to better guide clinical practice.

Keywords: Knee osteoarthritis, traditional Chinese medicine (TCM), progress.

1. Introduction

Knee osteoarthritis (KOA) is a degenerative condition brought on by aging, obesity, trauma, and anomalies in the joints. Epidemiological research has revealed that the frequency of knee osteoarthritis is aging, the prevalence of 50-59 years old is 13.4%, 60-69 years old prevalence can reach 19.5% [1]. Cartilage degeneration is the main pathological change. Due to the destruction, degeneration and loss of cartilage, osteophytes form at the edges of joints and subchondral bone sites, and joint pain, swelling, stiffness, deformity, joint friction, dysfunction and other symptoms appear. With the continuous development of the disease, it has the characteristics of high disability rate. At present, the pathogenesis of this disease has not been completely clarified, and research suggests that it is mostly related to gender, age, obesity, damp and dark living environment, standing and working habits, heavy manual labor occupation, knee injury history, and family history of osteoarthritis [2].

TCM, as a promising therapy with thousands of years of history, has also been gradually applied to the treatment of KOA. Traditional iatromy doctrine on the basis of the nosogenesis and pathological status quo KOA, pursuant to the theoretical knowledge of TCM, proposed to treat KOA with “arthralgia”. On this basis, it derived the treatment idea that if the bleeding is not smooth, “pain is not normal”, and the theory of treating KOA with “blood stasis” was proposed. Clinically, the use of TCM characteristic treatment methods such as TCM decoction, TCM external application, acupuncture, massage, etc., can achieve significant clinical effects [3]. At the same time, these methods are low-cost and have few side effects. However, most clinical studies on the intervention of TCM in KOA are single clinical studies, lacking the overall description of the efficacy of the therapy, and lack of high-quality research confirmation.

2. Take Chinese medicine internally

The author summarized some of the pathogenesis of KOA from the biological and biomechanical perspectives and expounded the occurrence and development process of KOA from the perspectives of synovial inflammation, chondrocyte autophagy and apoptosis, cartilage matrix degradation, VEGF erosion of cartilage tide line, and biomechanical imbalance. Combined with domestic and foreign studies on the application of Chinese medicines to KOA, it was found that Chinese medicines can regulate the signaling pathway axis. Such as PI3K/AKT/mTOR, SIRT1/AMPK, HIF-VEGF-Ang, and TLR4/PI3K/AKT/NF-B. It achieves the purpose of alleviating inflammation, reducing apoptosis and inhibiting angiogenesis, and finally delays the progression of KOA, which further confirms apply to TCM in the remedy of KOA [4]. For clinic investigation, 60 KOA patients were randomized into two teams at random, one for treatment and the other for manoeuvre, 30 cases in per team. For three weeks, the command team received oral etonocoxib tablets while the treatment team received Duhuo parasite decoction. The findings demonstrated that the levels of tumor necrosis factor (TNF-), interleukin-1 (IL-1), and interleukin-6 (IL-6) were lower after therapy than they were before treatment, and that $P < 0.05$ indicates that these differences were statistically significant. After remedy, there were no statistically important variations in the levels of IL-1, IL-6, or TNF- between the two teams ($P > 0.05$), however the cure team's Lequesne index was statistically significantly lower than the command team's ($P < 0.05$) the negative [5]. It can be seen that Duhuo parasitic decoction has significant clinical efficacy in the treatment of KOA, which is equivalent to western medicine therapy, can effectively reduce joint pain, reduce the level of inflammatory mediators in joint fluid, and improve joint activity dysfunction. It is also secure, deserving of therapeutic use, and deserving of promotion. 11 randomized commandled studies ($n=1132$) were included in a meta-analysis to examine the effectiveness of Duhuo zhizi Decoction in the treatment of KOA. The outcomes demonstrated that the decoction may successfully lower the level of inflammatory factors in patients with KOA, like TNF- α , IL-6, and IL-1 β , relieve pain symptoms, improve walking and living ability, less adverse reactions, and have good clinical efficacy.

3. External use of Chinese medicine

TCM external treatment is mainly the direct action of TCM on the lesion site, can avoid the first pass effect, so that the drug is not metabolized by the liver as much as possible, and play the efficacy, its side effects are small, easy to operate, accurate efficacy, high safety, favored by the majority of people. There are many kinds of external treatment methods of Chinese medicine, including application of Chinese medicine externally, Chinese medicine fumigation, etc., which have been unanimously praised by people [6].

4. Acupuncture therapy

Acupuncture and moxibustion is the treasure of TCM. With the deepening of reform and opening up and the development of “One Belt and One Road”, Chinese acupuncture and moxibustion has gradually entered the world stage. In November 2010, UNESCO included TCM acupuncture in the Representative List of the Intangible Cultural Heritage of Humanity. In February 2017, the “acupuncture bronze sculpture” stood in the hall of the World Health Organization (WHO), marking that Chinese acupuncture

has become the world's acupuncture. At present, acupuncture has become the most widely used traditional medicine in the world, applied in 193 countries and regions around the world, and has gradually been incorporated into the mainstream medical system as an important part of TCM. Remarkable progress has been made in the fields of discipline construction, medical and health services, scientific research, standardization and international communication, personnel training and education system construction [7]. Acupuncture and moxibustion treatment has quick effect and obvious effect. It plays an important role in resisting pathogenic factors and reconciling Qi and blood, mainly including acupuncture and moxibustion. Acupuncture is the use of professional acupuncture techniques to operate acupuncture points and stimulate specific points to achieve the purpose of treating diseases [8]. Wang Lei et al. found that the command team using ibuprofen sustained release capsule oral therapy, continuous use for 4 weeks by comparing ibuprofen and ibuprofen combined with warm acupuncture intervention in cold and damp obstruction KOA patients, the total effective rate 71.21%. On basis of the command team, warm acupuncture was administered to the observation team (OGP); the effectiveness rate was 86.36% ($P < 0.05$). In two teams, the ratings of unfavorable flexion and extension, stiffness, and joint swelling were adhering to rehabilitation, lesser compared to prior ones therapy ($P < 0.05$), in the meantime, while VAS scores in both teams were lower than those before to curative. In two teams, the hs-CRP concentrations, IL-6, and ESR were lesser compared to prior ones cure ($P < 0.05$), and the aforesaid indices were lower in the OGP than in the command team ($P < 0.05$). Following therapy, not only the ROM values of knee joint in both teams were higher than before treatment ($P < 0.05$), but also the ROM values of OGP were higher than those of command team ($P < 0.05$). The probability of adverse reactions in the OGP team was 1.52%, but the probability of adverse reactions in the command team was 9.09% more than that in the OGP team. It has been further confirmed that warm acupuncture and moxibustion has a significant effect on the treatment of cold-dampness impediment type KOA, which can effectively relieve clinical symptoms, reduce pain, reduce the body's adverse reactions, enhance joint mobility with high safety [9].

5. Massage

TCM uses massage as one of its primary therapy modalities. The idea of meridians and acupoints states that the relevant parts of the body surface are acted on by pushing, holding, kneading, pressing and kneading to achieve the purpose of relieving symptoms [9]. Peripheral nociceptive stimulation and central nervous system conduction and regulation of pain signals are the key pathological mechanisms of KOA pain. Massage can significantly relieve knee pain in KOA patients, and its mechanism is closely related to reducing peripheral nociceptive stimulation and regulating the brain center [10]. Some researchers believe that muscle and bone massage can significantly improve knee joint motion and pain in KOA patients, and increase the tibiofemoral joint space. A total of 102 KOA patients were chosen as the study subjects, and using the random number table approach, they were split into treatment and command teams, each consisting of 51 cases. Massage therapy was administered to the treatment team, while diclofenac diethylamine latex was given to the command team. The McMaster University of Western Ontario Osteoarthritis Index (WOMAC) score, the two teams' tibiofemoral joint space and level of pain were compared. The findings demonstrated that following treatment, the treatment team's joint function score, overall score, pain degree, and stiffness degree were all lower than those of the command team; these differences were statistically significant ($P < 0.05$). The treatment team had a statistically significant ($P = 0.001$) difference in pain ratings between itself and the command team. The treatment team had greater internal and lateral tibiofemoral joint space than the command team, and there was a statistically significant difference ($P = 0.001$), which further confirmed the effect of massage on alleviating KOA symptoms [11].

6. Traditional health care

In 2019, the Expert Consensus on Knee Osteoarthritis Ladder Treatment proposed that for patients with pre-KOA, it is recommended to focus on functional exercise, which can effectively improve KOA symptoms and alleviate the condition. As an important rehabilitation means of KOA treatment, the core

of functional exercise is the isometric contraction training of muscles, and the types of exercise mainly include land exercise, water exercise, strength training and so on. Studies have shown that appropriate functional exercises can enhance the strength and endurance of lower limb muscles, maintain the stability of the knee joint, and thus achieve the purpose of preventing KOA. Traditional Chinese exercises such as shadowboxing, eight paragraphs of brocade, five-animal boxing and tendon change classic all start from the holistic view of TCM. They are the organic combination of breathing, consciousness and movement, the combination of rigid and soft, and static and static, emphasizing the balance and coordination of limbs. Through multi-directional functional exercises, the ability of the human movement system can be improved, and the body can be strengthened and strengthened, thus improving KOA [9].

6.1. *Shadowboxing*

The intervention of shadowboxing exercise on KOA is comprehensive and systematic. Tai chi exercise can significantly reduce the pain of KOA patients, pleasure the body and mind, relieve the anxiety and depression of KOA patients, improve the dysfunction, and improve the quality of life. From the molecular level, it can not only decrease the production of pro-inflammatory substances, boost the production of anti-inflammatory substances, but also inhibit sympathetic nerve activity, activate parasympathetic nerve conduction, and relieve pain in many ways. GE Y et al. found through research that 8 weeks of tai chi exercise can not only relieve depression, anxiety and other emotions, but also regulate self-command behavior and improve sleep quality. In addition, tai chi exercises can directly or indirectly intervene in autonomic nerve regions associated with KOA. Other scholars have found that shadowboxing exercise can reduce autonomic nervous tension and improve neurobehavioral function, while long-term exercise can reduce the damage of free radicals to the body, improve cell metabolic function, delay the aging process to a certain extent, and increase the level of mental health. Therefore, while undergoing drug treatment, KOA patients can conduct Taijiquan exercise in a timely manner to relax their mood and relieve psychological symptoms [12].

6.2. *Eight paragraphs of brocade*

Eight paragraphs of brocade is a medium and small intensity aerobic exercise, the whole set of movement and static combination, soft and smooth, can harmonize qi and blood, dredge the meridians, balance Yin and Yang, insist on exercise has a positive effect on the sick person body shape and physiological function. In the whole set of Eight paragraphs of brocade, “hands supporting the Tianli Sanjiao” can exercise the patients’ balance ability, “left and right bow like shooting eagle” can exercise the muscle stability on both sides of the limbs, which is conducive to improving the tissue tension around the joint, increasing the joint motion, enhancing the endurance and muscle strength of the muscles around the damaged knee joint, and improving the stability of the knee joint. “Shake the head and tail to heart fire” can exercise the stability of multiple, “back seven atrocity disease elimination” can exercise the patient’s motor coordination ability, but also can accelerate the body’s blood circulation, reduce joint edema and local inflammation, prevent joint contracture, adhesion, and aid in the restoration of knee joint functionality. The effectiveness of eight trigrams boxing combined with a customized TCM health management program on functional rehabilitation and quality of life in KOA patients was examined in a randomized commanded observation study. Patients with KOA were randomized into two teams: an OGP (n=49) and a command team (n= 49). Routine intervention was given to both teams, and the OGP additionally received eight paragraphs of brocade along with individualized health management based on TCM. The intervention lasted for 3 months. The findings indicated that following the intervention, the OGP’s walking ability, pain, and living ability scores in the KOA severity index were lower than the command team’s, the team’s scores on the health survey summary table 36 were higher than the command team’s, and the team’s overall nursing satisfaction rate was 83.7% (95.9%) higher than the command team’s ($P < 0.05$) [13]. It was further confirmed that Eight paragraphs of brocade combined with personalized Chinese medicine health management program can promote the knee joint functional rehabilitation of KOA sick person, enhance the comfort of life

6.3. *The five-animal exercises*

Founded by the famous doctor Hua Tuo, the five-animal exercises is a kind of exercise which mainly imitates the daily behaviors of five animals, namely tiger, bear, deer, ape and bird. It has the characteristics of harmonizing Yin and Yang and regulating the spirit form, enhancing leg muscle strength and increasing lower limb balance command capacity and proprioception of knee joint, and reduce inflammation. Researchers selected 60 KOA patients who underwent arthroscopic surgery and they were split up into two teams., OGP and a command team on the basis of whether or not they were trained with the five Mimic-animal Boxing opera after surgery, each team included 30 patients. The OGP was trained with the five Mimic-animal Boxing opera for 1 month after surgery, while the command team was not given other treatments. The results highlighted that Lysholm scores and WOMAC scores of patients in both teams, compared to before surgery, were noticeably better after surgery($P < 0.05$), which confirmed the surgical treatment. At the same time, patients in the OGP had significantly higher Lysholm scores and WOMAC scores than those in the command team ($P < 0.05$). It is further proved that the knee joint exercise combined with the five Mimic-animal Boxing Play after surgery can improve the knee joint function more significantly, which have positive benefits for the late recovery of knee joint function after surgical treatment [14].

6.4. *Change your bone*

The easy tendons pay attention to the combination of aerobic exercise, flexibility exercise and strength training in one of the traditional Chinese exercises, the exerciser's limbs to maintain a specific posture, so that the body or some parts of the tightness is a continuous static contraction of the state of motion, thereby improving physical fitness, prevention and treatment of disease. Tendon change Classic exercise is also a physical and mental exercise method, focusing on body regulation, heart regulation, breath regulation, can relax the diseased tissue and improve the blood flow area to reduce arthritis symptoms, increased blood flow can make the body oxygen, nutrients and anti-inflammatory factors and other substances supply more efficient, inflammatory factors and other substances metabolism speed up. Regular "change your bone" exercise has potential effect on improving knee stability in KOA patients. A randomized controlled study compared the efficacy of Prokin proprioceptive training and Tendon change Classic exercise in improving knee stability in KOA patients aged 50 to 75 years. The results showed that compared with proprioceptive training, subjects in the Tendon change Classic exercise team after the intervention completed the sit-standing task. Significantly reduced knee flexor coactivation ratio. Jing Lanxiang et al. have confirmed that the exercise of Tendon change Classic has a positive effect on improving leg strength muscles and the coordinated contraction of muscles around the knee joint in people in middle and old age, thus enhance the dynamic and static equilibrium middle-aged and aged people and reducing the risk of falling [15].

7. **Combination therapy**

During the treatment of KOA, the combination of internal and external application of TCM is more effective than that of TCM alone or Western medicine. Through data analysis, the effect of TCM iontophoresis combined therapy and traditional single drug treatment for KOA was evaluated, which further provided evidence for the effectiveness and enthusiasm of TCM comprehensive treatment for KOA. The study included a total of 12 RCT, including 1147 patients. In a randomized trial, a combination of Chinese medicine iontophoreses was used to treat KOA. The command team was treated with one therapy, while the OGP was treated with a combined therapy of TCM iontophoresis. Turn out to be confirmed that the comprehensive treatment team had a much higher effective ratio than the monotherapy team [$RR=1.17$, 95% CI (1.14,1.24), $P=0.0003$]. It was further confirmed that the integrated iontophoretic therapy of TCM can significantly optimize and adjust, improve efficiency treating KOA compared with single therapy, it is valuable for clinical promotion [16].

About treating KOA, TCM combined with internal and external treatment is more effective than TCM or Western medicine alone. TCM has unique advantages in the treatment of KOA by applying TCM syndrome differentiation to internal administration combined with external application,

fumigation, acupuncture, manipulation and other external treatment methods to restore joint functional activities through the local heat, drug force and external force of drugs. It can improve the therapeutic effect. Chen Mo randomly 38 patients formed the command team, and 39 patients made up the experimental team. Patients in the command team received oral medications to improve collaterals and blood flow as well as reduce swelling and pain. while sodium hyaluronate was injected and other clinical routine treatment; the experimental team was given TCM combined treatment including internal administration and external use of TCM, what's more, manipulation, among which the manual therapy techniques was kneading the bones, holding the quadriceps muscle, rubbing the knee, rotating the knee and lifting the leg. The external application of drugs includes Haitong bark, Wilingxian, Qiang live, bone deep grass, raw grass aconite, raw river aconite, etc., ground into powder, boil with water, evenly stir into paste, cover the affected area, and the temperature should be tolerated by the patient's skin. Herbal medicine for Liuwei Dihuang pill to add or subtract. The effectiveness of the two teams' treatments was contrasted after two months. The outcomes revealed that the command team's total effective rate was 73.68%, compared to the experimental team's overall response rate was 92.31% [17].

Mesh meta-analysis, a total of 14,696 literatures were retrieved, and 58 literatures were finally included in clinical studies after review and screening and exclusion of irrelevant literatures. The study found that, In the outcome of clinical treatment efficiency, the best possible therapeutic formula is warm acupuncture and moxibustion + external application of Chinese medicine (SUCRA87.9%)> Massage + external application of Chinese medicine (SUCRA85%)> Massage + warm acupuncture and moxibustion (SUCRA83.3%)> Massage + small needle knife (SUCRA) 81.8%), but it was not very much different in conclusion comprehensive imagery among the four interventions; In the outcome of reducing the VAS pain score, the best possible treatment plan was: massage + small acupotomy (SUCRA90.9%)> massage + warm acupuncture (SUCRA 87.7%)> fire acupuncture (SUCRA81.9%)> warm acupuncture + external application of TCM (SUCRA75%); In the outcome of reducing the WOMAC knee stiffness score, the best possible treatment was: fire acupuncture (SUCRA 78.8%) > warm acupuncture (SUCRA78%) > acupuncture (SUCRA50.9%)>shadowboxing (SUCRA42.8%); Moxibustion (SUCRA88.8%)>shadowboxing (SUCRA75.2%)> electroacupuncture (SUCRA69.8%)> fire acupuncture (SUCRA62.2%) is the best possible treatment plan for reducing the WOMAC knee dysfunction score. Multiple data have fully confirmed the effectiveness of the treatment of KOA. Combined therapy is superior to single external therapy [18].

8. Conclusion

To sum up, TCM is effective, safe and reliable in treating knee arthritis. In clinical practice, according to the condition of patients with knee osteoarthritis, select internal administration, external application, acupuncture, massage, traditional health care or combination therapy to help KOA patients improve pain and exert positive effects on joint function. In short, the expand of TCM is the inevitable trend of the development of The Times, and traditional health care played the very vital role in this matter. How to make TCM better serve the national health is a problem that needs further exploration.

References

- [1] Wang Ke, ZHANG Zeyi, ZHANG Liwen et al. A systematic review and meta-analysis of biomechanical characteristics of sitting in patients with knee osteoarthritis of different ages[J].Tissue engineering research in China,2024,28(18):2939-2946.
- [2] Liao Jianqing, LV Jing, Peng Zhongyu et al. Progress of TCM experimental research on knee osteoarthritis[J].Journal of Liaoning University of Chinese Medicine,2021,23(03):89-94.DOI:10.13194/j.issn.1673-842x.2021.03.020.
- [3] Zeng Jiayu, HE Qi, Chen Baihao et al. Guided treatment by the theory of "blood stasis" : Interpretation of the mechanism of "iron overload" in knee osteoarthritis[J].Tissue engineering research in China,2024,28(11):1743-1748.

- [4] Mo Jian, Ye Sentao, ZHANG Xiaoyun. Progress of TCM monomer and compound in the treatment of knee osteoarthritis[J].Tissue engineering research in China,2024,28(11):1756-1761.
- [5] Zhang Qing, Awuti Ekm, many red, etc. Clinical effect of Duhuo parasitic Decoction on knee osteoarthritis[J].Chinese community physician,2022,38(25):70-72.
- [6] Cheng Xue, ZHANG Yongping, Xu Jian. Research progress on mechanism of external treatment of knee osteoarthritis with TCM[J].Asia-pacific traditional medicine,2021,17(09):180-183.
- [7] Xie Yixuan, Yan Shiyan, Chen Bo et al. The development of acupuncture in the new era[J].Science and technology Guide,2023,41(14):42-50.
- [8] Xie Honghua. Study on the clinical effect of Yijin meridian on knee osteoarthritis[D]. Guangxi University of Chinese Medicine,2023.DOI:10.27879/d.cnki.ggxzy.2022.000011.
- [9] Wang Lei. Effect of warm acupuncture and moxibustion on knee osteoarthritis with cold dampness obstruction and its influence on serum inflammatory factors[J].New TCM,2023,55(16):148-152.DOI:10.13457/j.cnki.jncm.2023.16.029.
- [10] Zhou Xiaoyuan, ZHOU Yunfeng, Xu Hui. Research progress on pain mechanism of massage therapy for knee osteoarthritis[J].Journal of TCM,2023,38(09):1895-1901.DOI:10.16368/j.issn.1674-8999.2023.09.307.
- [11] Wang Shuai, Cheng Wuzhong, Wang Ketian, et al. Effect analysis on the treatment of knee osteoarthritis by muscle and bone massage[J].Chinese community physician,2023,39(23):77-79.
- [12] Fan Yong Fu, Chang Yi Niu, Sukeqi, etc. Research progress on the influence and mechanism of Taijiquan on knee osteoarthritis[J].Chinese medicine Guide,2022,28(07):194-197.DOI: 10.13862/j.cn43-1446/r.2022.07.042.
- [13] Jiang Zanying, Fan Huixia, XU Juntao. Effects of Baduanjin combined with personalized TCM health management program on functional rehabilitation and quality of life of patients with knee osteoarthritis[J].Chinese rural medicine,2022,29(18):3-4.DOI:10.19542/j.cnki.1006-5180.006534.
- [14] Wu Hongfei, Ye Chao, Qi Jian et al. Observation of the curative effect of Wuqinxi combined with knee arthroscopic surgery on knee osteoarthritis[J].Journal of Modern Chinese and Western Integrative Medicine,2022,31(08):1072-1075.
- [15] Ye Y Y. Clinical study on the influence of Yi Jin Jing exercise on the stability of knee joint in patients with knee osteoarthritis[D].Fujian University of TCM,2020.DOI:10.27021/d.cnki.gfjzc.2020.000388.
- [16] Zhu Zhuqing, Zhang Lijuan, Liu Liang et al. Systematic evaluation of the effectiveness of iontophorescent combined therapy and monotherapy for knee osteoarthritis[J].Modern practical medicine,2019,31(09):1193-1195+1283-1284.
- [17] Chen Mo, Huang Ling, Xiong Yang, etc. Clinical effect of TCM combined with external application of TCM and internal administration in the treatment of senile knee osteoarthritis[J].clinical research of tcm,2013,5(11):99+101.
- [18] Guo H Y. A reticular meta-analysis of external treatment of knee osteoarthritis by TCM based on GRADE rating[D].Beijing University of Chinese Medicine,2021.DOI:10.26973/d.cnki.gbjzu.2021.000587.