

Clinical Progress in the Treatment of Knee Osteoarthritis with Traditional Chinese Medicine

Jun Ke¹, Yingang Li^{2,*}

¹Shaanxi University of Chinese Medicine, Xianyang, Shaanxi, 712046, China

²Department of Traditional Chinese Medicine Orthopedics and Traumatology, Affiliated Hospital of Shaanxi University of Chinese Medicine, Xianyang 712000, Shaanxi, China

*Correspondence Author

Abstract: *Knee osteoarthritis (KOA) is a degenerative disease mainly caused by pathological changes of knee cartilage and subchondral bone. In the early stage, knee pain is the main symptom, and the disease can develop into deformities and mobility disorders in the later stage, which seriously affect the quality of life of patients. As a traditional treatment method, traditional Chinese medicine has unique advantages and curative effect, and has been widely used in the treatment of knee osteoarthritis. By searching the databases of Wanfang, Weipu and Zhiwei, this paper reviewed the research progress of TCM treatment of knee osteoarthritis, including TCM internal administration, TCM external use, acupuncture and other treatment methods, as well as its mechanism and clinical application, aiming to provide an effective treatment plan for patients with knee osteoarthritis.*

Keywords: Traditional Chinese medicine, Knee osteoarthritis, Treatment, Progression, Overview.

1. Introduction

Knee osteoarthritis (KOA) is called proliferative osteoarthritis of the knee. The main clinical manifestations of knee osteoarthritis are joint stiffness, pain, swelling, bounce, fluid accumulation and limited movement. Deformities, movement disorders and even disability may occur in the later stages of the disease. Seriously affect patients' vital matter [1,2] and bring heavy economic burden to the society. Studies have pointed out that the incidence rate of KOA in China ranges from 5.4% to 30.5% [3], and the incidence rate of urban residents is higher than that of rural residents, and the incidence rate of women is 1.5 to 3 times that of men [4,5]. Traditional Western medicine mainly includes non-steroidal anti-inflammatory drugs, physical therapy and surgery, but its curative effect is limited and prone to side effects. In contrast, the treatment of knee osteoarthritis by traditional Chinese medicine (TCM) is a dominant disease in TCM orthopedics [6]. According to the current published clinical literature, TCM treatment is still an important means for the treatment of knee osteoarthritis in China, with advantages such as reliable curative effect, suitable price and few adverse reactions [7]. This paper reviewed the research progress of traditional Chinese medicine treatment of knee osteoarthritis in recent years by searching the databases of Wanfang, Weipu, Zhiwei, etc., in order to provide reference for clinical practice.

2. Methods of Treating Knee Osteoarthritis with Traditional Chinese Medicine

2.1 Herbal Oral Administration

Oral Administration of Chinese medicine is one of the commonly used methods for the treatment of knee osteoarthritis by Chinese medicine. Huang Danqi [8] treated 90 cases of knee osteoarthritis with the theory of kidney governing bone and treating kidney and bone in traditional Chinese medicine. The drug Bushen Zhuanggu Shujin decoction, twice a day, 6 weeks for a course of treatment. The drug was added or subtracted with the syndrome. Bushen Zhuanggu Shujin Decoction treated knee osteoarthritis, the

effective rate reached 86.7%. Shi Caiping [9] divided 90 patients with knee osteoarthritis into syndrome differentiation and types, including blood stasis blocking type, Yang deficiency and cold coagulation, kidney deficiency and pulp emptying type, and gave different prescriptions according to different types, which were administered orally. After treatment, both interleukin-1 (IL-1) and IL-6 were reduced, the immunity of patients was improved, and the total effective rate reached 95.6%.

According to the theory of traditional Chinese medicine, knee osteoarthritis is mostly caused by lack of Qi and blood and stasis blocking collaterality. Therefore, traditional Chinese medicine often uses activating blood to remove blood stasis and tonifying qi and blood as the main mechanism of action. The commonly used traditional Chinese medicine prescriptions include Guifu Dihuang pill, Wuguteng granule, Tianma Guteng granule, etc. These prescriptions have the effect of relaxing tendons and activating collaterals, relieving pain and reducing swelling.

2.2 Chinese Medicine External Treatment

Chinese medicine external treatment is to make Chinese medicine into ointment, paste and other forms, directly daub or paste on the patient's knee joint for treatment. He Zhengfeng [10], under the guidance of TCM syndrome differentiation and type classification, took different prescription internally for different syndrome types and combined with traditional Chinese medicine fumigation and external washing to treat 50 cases of knee osteoarthritis. The effective rate of the treatment group was 84%, higher than that of the steroid drug group of the control group, which was 66%. It embodies the advantages of both internal and external treatment of traditional Chinese medicine and the combination of whole and local treatment.

According to the theory of traditional Chinese medicine, the commonly used external treatment methods of traditional Chinese medicine include moxibustion, cupping and hot compress. These methods are able to promote local blood

circulation and relieve pain and swelling by stimulating acupuncture points and meridians around the knee joint.

2.3 Acupuncture Treatment

As an important part of traditional Chinese medicine, acupuncture is widely used in the treatment of knee osteoarthritis. Hong Kunda et al. [11] used warm acupuncture to treat knee osteoarthritis of different TCM syndrome types, and the warm acupuncture treatment for various syndrome types was 1 course of 10 times, and a total of 3 courses were carried out. After treatment, the efficacy and symptom scores of patients with knee osteoarthritis of all syndrome types were improved, and the differences were statistically significant compared with those before treatment ($P < 0.05$), and the contents of TNF- α , IL-1 and IL-6 in synovial fluid of joint were decreased ($P < 0.05$). However, the effect of Yang deficiency cold coagulation type warm acupuncture was the best, which was better than the other 3 syndromic types ($P < 0.05$).

According to the theory of traditional Chinese medicine, the main methods of acupuncture and moxibustion for knee osteoarthritis include warm acupuncture, electric acupuncture, embedding acupuncture and so on. These methods regulate the operation of qi and blood, improve local circulation, and relieve pain and swelling by stimulating relevant acupuncture points and meridians.

3. Mechanism of Treating Knee Osteoarthritis with Traditional Chinese Medicine

3.1 Inhibition of Chondrocyte Apoptosis

The apoptosis and proliferation of articular chondrocytes are like the balance of Yin and Yang in Chinese medicine. If the balance relationship is destroyed, it means the occurrence of diseases. Similarly, if the proliferation and apoptosis of chondrocytes lose their dynamic balance, chondrocytes will be destroyed, which leads to the occurrence of KOA. Related studies have shown that the apoptosis of chondrocytes in osteoarthritis patients is significantly higher than that in normal articular chondrocytes. Ma Zhigang [12] concluded through experiments that Chinese herbs for invigorating kidney and promoting blood circulation (*Eucommia ulmoides*, *rehmannia rehmannii*, *corydalis corydalis*, *cauliglotina spatholobi*, *achyrantes achyrantes*, *tricolor* and *safflower*) could inhibit the apoptosis of chondrocytes and improve the morphology of articular cartilage.

3.2 Control of Inflammatory Cytokines

The occurrence of knee osteoarthritis is closely related to inflammatory factors such as interleukin (IL), and an increased level of IL can enhance the activity of plasminase and destroy chondrocytes and extracellular matrix [13]. Pan Haile et al. [14] showed that Shenmai injection could reduce the level of IL-1 in the blood of osteoarthritis animals, so as to play a preventive and therapeutic role in osteoarthritis.

3.3 Regulation of Sex Hormone Levels

Studies have shown that the decrease of endogenous estrogen

is also one of the main reasons for the incidence of KOA [15]. Zhao Chuanxi et al. [16] found that Chinese herbs for tonifying kidney and promoting blood circulation (*Eucommia ulmoides*, psoralen, bone fracture supplement, Blood exhaustion, ripe ground, etc.) can effectively improve the cartilage metabolism and inhibit cartilage degeneration in ovariectomized KOA rats, the mechanism of which may be through increasing the serum estrogen content, thereby reducing the carboxy-terminal peptide content of type II collagen.

3.4 Improving Microcirculation and Reducing Intraosseous Pressure

Increased intraosseous pressure can lead to intraosseous venous stasis, which is also an important risk factor for KOA. Chen Dawei et al. [17] treated KOA by fumigation with traditional Chinese medicines such as Chuanxiong, Qianghua and Duhua, which improved microcirculation and alleviated venous stasis through heat effect and the efficacy of traditional Chinese medicine in promoting blood circulation and removing blood stasis, thereby reducing intrabone pressure and reducing cartilage injury.

In addition, activating blood circulation to remove blood stasis and relaxing tendons and activating collaterals are also important programs. In the theory of traditional Chinese medicine, knee osteoarthritis is mostly caused by Qi and blood stasis. The internal administration of Chinese medicine, external application and acupuncture and other treatment methods can improve the blood circulation of the knee joint through the mechanism of promoting blood circulation and removing blood stasis, and promote the dissipation of inflammation, thus relieving pain and swelling. The occurrence of knee osteoarthritis is related to the obstruction of the vein, and the main mechanism of TCM treatment is to relax the tendons and activate the collaterality. The internal administration of Chinese medicine, external application and acupuncture and other treatment methods can stimulate the acupuncture points and meridians, improve the circulation of qi and blood around the knee joint, relieve muscle tension, and thus improve joint function.

4. The Clinical Application of Traditional Chinese Medicine in Treating Knee Osteoarthritis

Osteoarthritis belongs to the category of traditional Chinese medicine "bone arthralgia" and is one of the five body arthralgia. "All deficiency memory, deficiency of healthy qi", knee osteoarthritis is based on "primary deficiency" [18], and deficiency of liver and kidney is its core pathogenesis. Qing · Wu Cheng "Bujuji" said: "People with vacuity, essence does not transform Qi, qi does not transform essence, the congenital true yuan is insufficient, the road of the whole body is impenetrable, obstructing Qi and blood, and can not nourish the meridians for pain. The reason is that the water does not support the wood and the hypochondriac pain, the essence and blood failure is less and the waist pain, the true Yin is exhausted and the bone pain, the organ is not good and the neck pain, the bone marrow is empty and the back pain, the three Yin deficit and the leg and knee pain, these are not external evils, but the deficiency of the liver and kidney." It is

pointed out that pain is not universal, pain is not honor, liver and kidney insufficiency is the internal pathogenesis of knee osteoarthritis. "Jingyue Complete book" that: "cover arthralgia closed also, with Qi and blood for evil closed, can not pass and disease also." Internal deficiency and external sensation, qi stagnation, blood stasis and spittoon can induce knee osteoarthritis [19]. "Medical school must read · Bi": "bone bi is cold bi, pain bi also." Ming · Li Zhongzi "Ling pivot · thorn section true evil" said: "The people also in the deficiency evil, sprinkle the shape, from the hair and hair Cou Li, its deep, internal stroke in the bone, is bone bi." Pointed out that the evil can intrude the human body muscles and bones joints, blocking the meridians of Qi and blood, causing people to appear heavy limbs, joint pain symptoms. The clinical application of TCM in the treatment of knee osteoarthritis mainly includes TCM syndrome differentiation and TCM combined with other treatment methods. According to the patient's specific condition and the result of syndrome differentiation, the TCM doctor will choose the appropriate Chinese medicine prescription and treatment method for treatment according to the principle of syndrome differentiation. At the same time, traditional Chinese medicine is often combined with physical therapy and rehabilitation training to enhance the curative effect.

5. Progress of Clinical Research on Treatment of Knee Osteoarthritis with Traditional Chinese Medicine

In recent years, the clinical research on the treatment of knee osteoarthritis with traditional Chinese medicine has gradually increased. Among them, some clinical observation and randomized controlled trial studies have shown that traditional Chinese medicine has certain efficacy in the treatment of knee osteoarthritis, which can significantly relieve pain, improve joint function and improve quality of life. At the same time, some studies have shown that traditional Chinese medicine can also play a role in reducing the side effects of drugs and delaying the progression of arthritis. However, there are still some limitations in the current study, such as small sample size and imperfect study design, and more large-sample, multi-center clinical studies are needed.

6. Safety and Precautions of Traditional Chinese Medicine in Treating Knee Osteoarthritis

Traditional Chinese medicine is relatively safe in the treatment of knee osteoarthritis, but there are still some things to pay attention to. First, patients should choose regular medical institutions and qualified Chinese medicine doctors for treatment; Secondly, the treatment plan should be individualized according to the patient's specific situation; Finally, in the course of treatment, regular visits should be made to adjust the treatment plan in time.

7. Conclusion

As a traditional treatment method, Chinese medicine has unique advantages and curative effect in the treatment of knee osteoarthritis. It can relieve pain, improve joint function and

improve quality of life by taking traditional Chinese medicine internally, using traditional Chinese medicine externally and acupuncture. However, there are some limitations in the current study, and further more clinical studies are needed to verify the efficacy and safety of TCM in treating knee osteoarthritis.

References

- [1] Cao Pufei, He Sijun, Song Yinghong, et al. Clinical observation of Shengyu Decoction combined with Wuling SAN in the treatment of knee osteoarthritis complicated with synovitis [J]. Journal of Practical Clinical Integration of Traditional Chinese and Western Medicine, 2016, 16 (12): 42-43.
- [2] Zhang Hongmei. Standard diagnosis and treatment of knee osteoarthritis [J]. Chinese Journal of Osteoarthritis, 2019, 32 (5):391-395.
- [3] Tang X, Wang S, Zhan S, et al. The prevalence of symptomatic knee osteoarthritis in China: Results from China Health and Retirement Longitudinal Study[J]. Arthritis & Rheumatology, 2016, 68 (3): 648-653.
- [4] Wang Wei, Wang Kunzheng, Dang Xiaoqian, et al. Correlation factors of knee osteoarthritis in middle-aged and elderly people [J]. Chin J Tissue Engineering Research, 2006, 10 (44):15-18.
- [5] Yu W, Xu L, Qin M W, et al. An epidemiological survey of knee osteoarthritis in the elderly in Beijing city -- a clinical and linear comparison with Caucasian knee osteoarthritis in the United States [J]. Chinese Journal of Radiology, 2005, 39 (1):67-71.
- [6] Li SHM. Observation of clinical effect of traditional Chinese Medicine on knee osteoarthritis [J]. Inner Mongolia Traditional Chinese Medicine, 2014, 6 (27): 18-19.
- [7] Xu Xuemeng. The characteristic therapy of knee arthralgia (osteoarthritis) in TCM [N]. Chinese Journal of Traditional Chinese Medicine, 2015-11-13-5.
- [8] Huang Danqi. Clinical study of treating knee osteoarthritis with the theory of kidney main bone in traditional Chinese medicine [J]. Chinese Journal of Clinical Medicine, 2011, 39 (5): 63-64.
- [9] Shi Caiping. Curative Effect of Applying Traditional Chinese Medicine Syndrome Differentiation to Treat Knee Osteoarthritis and Analyzing Their Immune Status [J]. Journal of Sichuan of Traditional Chinese Medicine, 2015, 33 (11): 81-83.
- [10] He Zhengfeng. Clinical observation on treatment of knee osteoarthritis by TCM syndrome differentiation and classification [J]. Clinical Journal of Chinese Medicine, 2011, 23 (5): 425-426.
- [11] Hong Kunda, Li Li, Li Xihai, et al. Clinical Observation of Warm Needling Therapy for Treating Knee Osteoarthritis of Different Chinese Medical Syndrome Types [J]. Chinese Journal of Integrated Traditional and Western Medicine, 2012, 32 (11): 1466-1469.
- [12] Ma Zhigang. Experimental study on prevention and treatment of knee cartilage degeneration with Bushen Huoxue prescription [D]. Nanjing: Nanjing University of Traditional Chinese Medicine, 2011.
- [13] Chen J J, Zhuang R J, Fan X, et al. Correlation between subchondral inflammatory area and interleukin-1 content in joint fluid in knee osteoarthritis [J]. Journal of

- Traditional Chinese Medicine Bone Orthopaedics, 2016, 28 (4): 9-11.
- [14] Pan Haile, Qu Bo, Wang Ye. Effect of Shenmai Injection on blood interleukin-1 level in animal model of osteoarthritis [J]. Chinese Journal of Orthopaedics and Traumatology of Traditional Chinese Medicine, 2000, 8 (1): 17-18.
- [15] Guo Xinju, Ma Ying, Zeng Yan, et al. The relationship between plasma sex hormone and cellular level and knee joint function in menopausal patients with osteoarthritis [J]. Chinese Journal of General Medicine, 2008, 11 (10): 852-854.
- [16] Zhao C X, Wu H, Cao J M, et al. Effects of Chinese medicine for tonifying kidney and promoting blood circulation on E2 and CTX-II in rats with ovulated knee osteoarthritis [J]. Rheumatology and Arthritis, 2012, 1 (3): 43-45.
- [17] Chen Dawei, Zhang FangJian, Bai Shuchen, et al. Clinical observation of 60 cases of knee osteoarthritis treated by external treatment of traditional Chinese medicine (TCM) [J]. Journal of Traditional Chinese Medicine, 2012, 53.
- [18] Liu Ruoshi, Zhang Jie. Osteoarthritis and its prevention and treatment principles from the theory of “ethylene and Decyl homology” [J]. Journal of Liaoning University of Traditional Chinese Medicine, 2018, 20 (11):122-125.
- [19] Tang K, Chen X, Liu J, et al. Ding E on the academic characteristics of the treatment of knee osteoarthritis [J]. Clinical Journal of Chinese Medicine, 2015, 27 (5): 628-629.