

Research Progress in the Treatment of Knee Osteoarthritis with Chinese Medicine

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Abstract: This paper reviews traditional Chinese medicine's research progress in preventing and treating knee osteoarthritis according to the domestic literature in recent years. The main contents of the research are collated, analyzed, and summarized. The results show that traditional Chinese medicine for the treatment of knee osteoarthritis includes single medicine, compound medicine, acupuncture, and drug combination, which can affect related molecules in experiments or clinical and achieve the purpose of treating knee osteoarthritis. Many conclusions are drawn from the research. Traditional Chinese medicine can affect the occurrence, development, and outcome of knee osteoarthritis at the molecular and cellular levels through multiple forms and multiple targets to achieve the treatment's purpose.

Keywords: TCM treatment; Knee osteoarthritis; Research progress

1. Introduction

Knee osteoarthritis (KOA) is a degenerative joint disease characterized by articular cartilage degeneration, subchondral osteosclerosis or cystic degeneration, osteophytes at the joint edge, and synovial inflammation, with joint pain and limited movement as the main symptoms. KOA seriously affects the quality of life of the middle and old people in China and aggravates with the aging degree of the Chinese population, and the prevalence rate is rising gradually [1]. At present, the KOA's treatment strategy mainly recommends stepped-up treatment. According to the disease degree of patients from low to high, from the internal conservative treatment, minimally invasive surgical treatment, and open surgical treatment to choose the most appropriate method. Conservative treatment includes physiotherapy, Western medicine, and Chinese medicine [2]. Among them, TCM therapy includes single medicine, compound medicine, acupuncture, and so on. This article reviews the research progress of traditional Chinese medicine treatment of knee osteoarthritis in recent years.

2. Understanding of knee osteoarthritis in traditional Chinese medicine

TCM treatment of KOA has a long history and has its own unique advantages, the curative effect is sure. As early as more than 2,000 years ago, it was described in medical texts, such as Suwen, On the Long Prickle Section, which said, "The disease is in the bone, the bone is heavy and cannot be lifted, and the bone marrow is sore, which is called bone arthralgia." In addition, the etiology and pathogenesis of the disease were analyzed. "Su Q and Arthralgia" pointed out that "Wind, cold and dampness are mixed and combined to be Bi." The invasion of evil qi was one of the causes of the disease. "Su Wen. Inverse modulation" pointed out that "kidney is water, but born in bone, the kidney is not born, the pulp can not be full, so cold even bone. ... Disease called bone arthralgia, is when clononic section also ", Zhengqi deficiency is also one of the causes of disease. In addition, it also makes a general differentiation and classification of Bi. "Su Q. On Arthralgia"... The winner of its atmosphere is Bi, the winner of cold is pain bi, and the winner of dampness is Bi. "This discussion provides the basis for the treatment of syndrome differentiation by later doctors. Although the concept of modern knee osteoarthritis and "bone bi" concept is not the same, but KOA also belongs to the Chinese medicine "bi disease" category, related syndrome differentiation is also based on "bi disease".

3. Study on the treatment of knee osteoarthritis with Chinese medicine

3.1 Study on Single Chinese Medicine

At present, studies have shown that Chinese medicine Antler Antler can inhibit the expression of related bone metabolism genes, reduce the degradation of proteoglycan in cartilage, and slow down the degree of osteoarthritis degeneration. Sun Zhitao et al. [3] established a rabbit model of osteoarthritis by anterior cruciate ligament dissection. After intervention with different concentrations of antler, hydroxyproline content, mRNA of cartilage target genes, proteoglycan, and collagen type II in both knee joints were detected. The results showed that hydroxyproline content, TIMP-3 mRNA, proteoglycan, and type II collagen expression in low dose and high dose Antler Antler groups were higher than those in the control group, and high dose group was significantly higher than low dose group. ADAMTS-4 mRNA expression in low dose and high dose Antler Antler groups was significantly lower than that in the control group, and the high dose group was significantly lower than the low dose group. It is suggested that velvet antlers can inhibit ADAMTS-4 secretion, promote the secretion of protective factor TIMP-3, prevent the degradation of proteoglycan and type II collagen, and play a role in repairing cartilage.

Studies have also shown that Strychnine can regulate chondrocyte apoptosis and intraosseous pressure to prevent and treat KOA. Hong Zhenqiang et al. [4] established the Hulth-Telhag model of rabbit knee OA and injected total Strychnine alkali into the joint cavity. After treatment, pathological changes of articular cartilage were observed by light microscope and mankin's score, and the contents of NO, SOD, LPO in articular fluid, and PYD in urine were detected by ELISA. The results showed that mankin's score, urinary PYD, NO, and LPO in joint fluid and SOD were decreased in high-dose and medium-dose groups compared with the model group. Pathological changes in articular cartilage after treatment were observed using light microscopy and Mankin score, and levels of NO, SOD, LPO in synovial fluid and PYD in urine were detected. It is suggested that the total Strychnine base has repair effect on OA cartilage injury. The mechanism may be to promote the elimination of free radicals by inhibiting lipid peroxidation, increasing the expression of SOD, and further inhibiting the apoptosis of chondrocytes, so as to play a role in protecting and repairing cartilage. The whole blood viscosity and plasma viscosity of Strychnine administration group were lower than those of model group. It is suggested that Strychnine can improve bone microcirculation and cartilage metabolism, regulate bone pressure, reduce cartilage damage and prevent OA.

Zhong Huan et al. [5] injected papain into the knee cavity of rabbits to create an animal model of KOA. After the treatment with different concentrations of asarum aqueous solution, the lameness and knee swelling of rabbits in each group were observed, as well as the histopathologic status of IL-1 β and TNF- α after HE staining. Results Lameness and swelling of knee joint were improved after asarum decoction, IL-1 β and TNF- α in muscle, synovium and cartilage were decreased significantly. The results indicated that asarum had obvious anti-inflammatory effects on muscle, synovium and cartilage of KOA rabbits, but no significant difference was found in the anti-inflammatory effects of all tissues. The results indicated that asarum can reduce inflammatory factors and prevent KOA through anti-inflammatory effect.

In addition, agkistrodon acutus can prevent and treat KOA by promoting chondrocyte proliferation, enhancing chondrocyte vitality and improving articular cartilage. Wang Cawei-et al. [6] injected iodoacetic acid into the joint cavity of rats to establish the OA pain model, and injected treatment into the joint cavity with the control solution of acutodon acutus water extract and normal saline. After each administration, the degree of tenderness and heat pain of the rats' legs and the pathological changes of the synovial tissue after final execution were observed, and the results showed that the pain in the agkistrodon acutus group was relieved and the heat pain threshold was prolonged compared with the model group one week after modeling. Pathological section model group showed typical OA degeneration, agkistrodon acutus group basically returned to normal, chondrocytes and stroma close to normal level. In addition, CCK-8 method was used to detect the effect of water extract of agkistrodon acutus at different concentrations on chondrocyte proliferation. The results showed that the chondrocyte vitality after intervention of agkistrodon acutus was significantly higher than that of model group. It is suggested that agkistrodon acutus solution can relieve joint pain and repair damaged chondrocytes in OA rats. The specific mechanism may be related to promoting chondrocyte proliferation and enhancing chondrocyte vitality.

3.2 Study on compound drugs

Through the coordination of various traditional Chinese medicines, the compound medicine can harmonize the flavor to the meridian, warm the meridians, promote blood circulation and relieve pain, so as to make the drug effect stronger, reduce inflammatory factors, and make the range of action more precise through the specific signal pathway, so as to play a comprehensive treatment for KOA. Li Yuan et al. [7] found in the experimental study that Chinese herbal compound Liuwei Gubi Decoction (Herba medii, Nanwujia PI, kieshao, Radix Huaiushi, Gushaobu and Radix glycyrrhiza) could effectively reduce the contents of IL-1 β , TNF- α and MMP-13 in the joint fluid of rabbit OA model, and alleviate inflammatory symptoms. Meanwhile, the degree of relief of synovial inflammation was positively correlated with cartilage repair and collagen type II expression. It is proved that relieving synovial inflammation is effective in repairing cartilage injury and relieving OA symptoms, which provides a new idea for the multi-channel treatment of OA.

Liu Yang et al. [8] compared Yougui Wan group (cooked Rehmannia, Chinese yam, dogwood, wolfberry, deer horn gum, cuscuta seed, eucommia ulmoides, angelica, cinnamon, aconite), inhibitor group (Yougui Wan +TGF- β 1 /Smads signaling pathway inhibitor) and model group (normal saline) by modeling KOA rats. The pathological sections of cartilage tissue, inflammatory factors, type II collagen and matrix metalloproteinase were observed. The results showed that Yougui pill group was superior to inhibitor group, and inhibitor group was superior to model group. Moreover, the mRNA and protein expressions of TGF- β 1, Smad2 and Smad3 in Yougui Pill group were higher than those in inhibitor group. It was found that Yougui Pill may play a protective role in articular cartilage by activating TGF- β 1 /Smads signaling pathway.

The clinical study results of Lin Huajie et al. [9] showed that Duhuo Zhi Decoction (Ligusticum ligusticum, Duhuo, angelica sinensis, parafangse, Mulberry Zizi, Gentiana Gentiana, Radix nobilis, Eucommia ulmoides, poria cocos, cinnamon and licorice) combined with diclofenac sodium sustained-release tablets in the treatment of KOA patients could effectively improve the therapeutic effect and reduce the pain of patients compared with the control group (only using diclofenac sodium sustained-release tablets). The reduction of laboratory indexes MMP-1 and IL-6 was greater than that of control group, and the incidence of adverse reactions was smaller than that of control group. It is suggested that Duhuo Zhizhi Decoction can improve the therapeutic effect, relieve pain, reduce the level of inflammatory factors and the occurrence of adverse reactions. It has also been found that the serum containing Duhuo Zhizhi Decoction can reduce the concentration of Zn²⁺ in chondrocytes under IL-1 β -induced inflammation, and inhibit the expression level of Zip8mRNA and protein. When articular cartilage is in an inflammatory state, the transporter ZIP8 transports the extracellular Zn²⁺ into the intracellular, and the influx of Zn²⁺ promotes the massive activation of intracellular metal-regulated transcription factors (MTF1), which in turn up-regulates the expression of matrix metalloproteinases (MMPs), leading to the degradation of cartilage matrix. Therefore, it can be preliminarily believed that Duhuo Zhizhi Decoction maintains the homeostasis of Zn²⁺ in cells by regulating the expression of ZIP8 protein, thus inhibiting the transcription and activation of MTF1 and MMPs, and thus delaying the degeneration of articular cartilage [10].

3.3 Study on combination of needles and drugs

Acupuncture and moxibustion is the general name of acupuncture and moxibustion. Needle method is the use of metal needle, with certain techniques to Pierce the human body acupoints, or lift and insert or twist the qi, dredge the human qi and blood meridians, so as to play a therapeutic role; Moxibustion is a method of rubbing moxa wool into moxa sticks or moxa pillars and lighting them to warm the skin surface, so as to warm the meridians and harmonize Qi and blood. Acupuncture or moxibustion has been widely used in clinic for many years with reliable curative effect. It has a unique position in the treatment of knee osteoarthritis. Wang Bo et al. [11] observed the clinical efficacy of warm acupuncture and moxibustion combined with Qiang Fangqubi Decoction in the treatment of cold and dampness-blocking knee osteoarthritis, showing that the total effective rate in the treatment group was 90.0%, higher than 73.3% in the control group. Experimental methods: Sixty patients with cold and dampness arthralgia type knee osteoarthritis were divided into control group and treatment group, 30 patients in each group. The control group was treated with celecoxib oral capsule, and the treatment group was treated with heating acupuncture combined with Qiang Fang Qubi decoction on the basis of the control group. Chen Jinshen et al. [12] treated 60 cases of knee osteoarthritis with acupuncture combined with medicine, and the total effective rate after treatment was 86.67%, which was significantly better than 70.00% in the control group. 30 cases in the treatment group received acupuncture combined with self-designed prescription

for knee Bi Shu, while 30 cases in the control group received acupuncture alone. Liang Zexu et al. [13] observed that the combination of wrist and ankle acupuncture combined with Guizhi Shaoyao Zhimu Decoction had significant curative effect in the treatment of knee osteoarthritis, and patients in the observation group could effectively improve knee symptoms, relieve pain, and improve daily activity ability. Compared with other acupuncture methods, wrist and ankle acupuncture was convenient and simple in operation, with fewer acupoints and higher safety at the point selection site. Li Bingjie et al. [14] observed the significant clinical effect of moxibustion via tendon and Duhuashi Decoction in the treatment of wind-cold-dampness bi knee osteoarthritis, and divided 90 cases of wind-cold-dampness bi patients into a treatment group and a control group with 45 cases each. The treatment group was treated with moxibustion via tendon and Duhuashi decoction, while the control group was treated with conventional western medicine. The results showed that the total effective rate of the treatment group was 91.11%, which was higher than that of the control group 75.56%.

4. Conclusions

KOA is a common joint degenerative disease in clinical practice. Although the pathogenesis of knee osteoarthritis has not been fully understood, several key factors leading to OA are basically recognized. These include mechanical stress (mainly due to overload, force line imbalance, or obesity), previous joint injuries (such as meniscus tears, cruciate ligament injuries, etc.), specific occupation and sport, gender (more commonly seen in women), ethnicity, genetics, diet, bone mineral density, and aging [15]. In recent years, the incidence of knee osteoarthritis has increased significantly, ranging from 60% in people over 55 years old to 85% in people over 65 years old [16]. By 2020, osteoarthritis will be the fourth leading disabling disease worldwide [17]. At present, the treatment of KOA is divided into surgical treatment and non-surgical treatment. At present, there are many surgical treatment measures and the clinical effect is good, but the requirements for surgical indications of KOA are strict, and the appropriate surgical method is selected according to the KOA grade and clinical symptoms. The results of arthroscopic surgery are clear in the cases of osteoarthritis with interlocking and limited flexion and extension caused by meniscal tear and free body. Proximal tibial osteotomy has been widely used in KOA patients with inversion deformity. Pfo is mainly used to treat early localized medial compartment KOA with medial space reduction and mild varus deformity. Artificial knee replacement is the most effective way for patients with severe and extensive joint lesions. However, surgical operations have many problems such as high cost, high risk, and many complications. For early and middle KOA patients or relatively young patients, if there is no surgical indication, the main treatment is analgesics, non-steroidal anti-inflammatory drugs and corticosteroids, which have the advantages of rapid onset and rapid relief of clinical symptoms, but long-term oral non-steroidal anti-inflammatory drugs and corticosteroids will have some adverse effects, and there is a certain potential dependence and drug resistance. It cannot prevent the progression of arthritis, the prognosis is poor, there are certain deficiencies and limitations, and the treatment cost is high. In recent years, Chinese medicine has a remarkable effect on the prevention and treatment of knee osteoarthritis, with obvious simple, simple, convenient and cheap characteristics, compared with Western medicine conservative treatment has the advantages of accurate efficacy, low price, small adverse reactions, flexible methods, and so on. It is a priority treatment for knee osteoarthritis in the early and middle years. In recent years, the theory of the treatment of knee osteoarthritis with traditional Chinese medicine has been enriched, the related research has been expanded, the clinical effect has been affirmed, and the future has a good development prospect.

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