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Research Progress of External Treatment of Osteoarthritis of the Knee in Chinese Medicine

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Abstract: Knee osteoarthritis (KOA) is a common disease, which is mainly characterized by joint degeneration and chronic inflammation, especially in middle-aged and elderly people with a high incidence. Patients with KOA often feel joint pain and dyskinesia, in addition, the disease has a certain degree of disability, which seriously affects the quality of life of patients [1]. This paper reviews the studies on the treatment of osteoarthritis of the knee with Chinese medicine in the last 5 years and finds that external Chinese medicine treatments such as external Chinese medicine therapy, acupuncture and moxibustion have significant efficacy in relieving the clinical symptoms and improving the laboratory indexes of the patients. This article reviews the application of external Chinese medicine treatments in osteoarthritis of the knee in recent years, aiming to summarize the research progress and provide reference for clinical treatment.

According to modern medicine, knee osteoarthritis (KOA) is a common chronic joint disease whose main features include degeneration of the knee cartilage, bone redundancy formation, synovial inflammation, and subchondral bone sclerosis Common clinical symptoms include pain, swelling, deformity, and limitation of motion. In advanced stages of the disease, irreversible structural damage and severe dysfunction of the joint may occur, so surgical intervention, such as artificial joint replacement, is usually required. Currently, drugs commonly used in Western medicine to treat KOA include NSAIDs and biologics. Although these drugs can provide rapid relief of symptoms, they may have significant side effects with long-term use. The external treatment method of Chinese medicine has achieved satisfactory efficacy in the clinic due to its simple and convenient operation and low toxicity and side effects. In recent years, the study of external Chinese medicine treatment for KOA

has been increasing, and the author has now searched China Knowledge Network (CNN) for "osteoarthritis of the knee, external Chinese medicine" as a search term to find out the general situation of external Chinese medicine treatment for KOA in the past 5 years, and the following discussion is now made.

1. Herbal topical therapy

1.1 External application of traditional Chinese medicine

It is a kind of therapy in which Chinese herbs are ground to fine powder, added with water, white wine or ginger juice to form a paste or cake, and applied to the affected area or acupoints, so that the drugs are absorbed through the cortex and stimulate the meridian acupoints to achieve the effect of unblocking the meridians and collaterals. Jia Chenglin et al[2] divided the patients with cold-damp paralysis type KOA into a combined group and a control group according to the randomized numerical table method, the control group was treated with oral etoricoxib, and the combined group was given Nanxing Turbobronchial Ointment on the basis of the control group treatment. After treatment, it was found that the efficacy of Nanxing Turbobone Cream combined with etoricoxib was better than that of etoricoxib alone, and the total effective rate of the combined group was higher than that of the control group after treatment and 3 months after treatment ($P<0.05$); the VAS and WOMAC scores of the combined group were lower than that of the control group before treatment and 3 months after treatment ($P<0.05$), so it can be seen that the Nanxing Turbobone Cream combined with etoricoxib was more effective than the control group ($P<0.05$). It can be seen that the combination of Nanxing Turbobone Cream external application and etoricoxib tablets in the treatment of patients with osteoarthritis of the knee with cold-damp paralytic obstruction can improve the clinical efficacy, effectively improve the activity function of the knee joint, and reduce the pain. Chen Xiaofang et al [3] treated patients with osteoarthritis of the knee by applying topical application of Qingliang activation powder (composed of rhubarb, sumac, safflower, blood exhaust, frankincense, strychnine, myrrh, scutellaria, dahuric dahurica, clove, gardenia, cypress, natural copper, etc.) on the basis of oral administration of glucosamine sulfate capsule. The results showed that after treatment, the step frequency and step speed of the treatment group were higher than those of the control group ($P<0.05$), the laboratory inflammation indexes of CRP, ESR and WBC were lower than those of the control group ($P<0.05$), the symptom scores, LKSS scores, step frequency and step speed and the total effective rate of the treatment group were higher than those of the control group, and the VAS scores were lower than those of the control group, which suggested that the Qingliang Activation Dispensary could effectively alleviate the pain of patients, improve the function and walking gait of the knee joint, and improve the clinical and clinical conditions of the knee joints. This suggests that Qingliang activation powder can effectively reduce patients' pain, improve knee joint function and walking gait, and improve clinical efficacy. The reason for this is that Qingliang activation powder regulates the level of inflammatory factors in the serum, thus reducing the pain of the patients and improving the function of the knee joints, and with the reduction of pain, the walking gait of the patients is also improved.

1.2 Traditional Chinese Medicine Fumigation

That is, through the steam produced by the decoction of traditional Chinese medicine to fumigate the lesions or acupoints, through the combination of pharmacological action and thermal radiation until the lesion, so that the cold and dampness of the evil along with sweating to achieve the effect of dispersing cold and removing dampness of the therapy. Chen Weihua et al [4] divided KOA patients into the group of eliminating blood stasis and knee soup fumigation combined with intra-articular platelet-rich plasma (PRP) and the group of Chinese and Western medicine according to the randomized numerical table method, and the group of PRP received intra-articular PRP injection, while the group of Chinese and Western medicine received eliminating blood stasis and knee soup fumigation combined with intra-articular PRP injection. After treatment, it was found that the WOMAC scale scores and total scores of KOA patients were reduced and the knee dysfunction of KOA patients was improved after the administration of the fumigation therapy with the elimination of blood stasis and knee soup. The reason for this may lie in the fact that the fumigation therapy using the Elimination of Blood Stasis and Tong Knee Soup uses steam to warm up the knee, increase the skin temperature, dilate the local capillaries, promote the circulation of blood and lymphatic fluid, and then improve the blood flow of the synovial membrane, as well as reduce the synovial inflammation and eliminate the local swelling. Therefore, Chinese herbal soup fumigation treatment can further improve the knee joint dysfunction of KOA patients and improve the quality of life of patients. Zheng Shaohua et al [5] conducted a clinical controlled experiment on KOA patients, which was divided into a control group and an observation group according to the randomized numerical table method; the control group was given home rehabilitation exercises, and the observation group was combined with traditional Chinese medicine fumigation on the basis of the control group. After the treatment, it was found that the scores of somatic life ability, instrumental daily life ability and the total score of the scale of the observation group were significantly lower than those of the control group ($P<0.05$), which indicated that the combination of traditional Chinese medicine fumigation and at-home rehabilitation exercise could significantly enhance the daily life ability of the patients, and improve the somatic function of the patients, and the combination of traditional Chinese medicine fumigation and at-home rehabilitation exercise could significantly improve the function of the knee joints of the patients with osteoarthritis of the knees, and reduce the degree of inflammatory reaction and pain of the knee joints of the patients. Chinese medicine fumigation combined with home rehabilitation exercise can significantly improve the knee joint function of patients with osteoarthritis of the knee, reduce the degree of inflammatory reaction and pain of the knee joint of the patients, improve the lower limb function of the patients, and improve the lower limb muscle strength, balance and daily life ability of patients.

1.3 Chinese medicine collapse therapy

Based on the dialectical treatment of traditional Chinese medicine, specific Chinese medicines are decocted (or made into medicinal mud, medicinal paste), moistened with gauze, towels and other dressings, and then applied externally to the lesion while hot (or at room temperature), combined with

local hot iron or cold compresses, so that the medication is absorbed by penetration of the skin, and at the same time regulates the operation of qi and blood with the help of temperature stimulation, realizing the purpose of treating the disease internally and externally. Wang Xiangxiang et al[6] treated patients with osteoarthritis of the knee with qi stagnation and blood stasis, the control group was given erliximab orally, and the observation group was given traditional Chinese medicine collapsed and external application on the basis of the control group. After treatment, the TCM symptom score, interleukin 6, WOMAC score and VAS score of the observation group were better than those of the control group ($P < 0.05$), so the Chinese medicine collapsing impregnation with erliximab in the treatment of qi stagnation and blood stasis type knee osteoarthritis has a good clinical efficacy, which can effectively improve the joint pain of the patients, reduce the intra-articular inflammation, increase the mobility of the affected knee, and enhance the life span of the knee, providing an effective and effective solution for the treatment of knee osteoarthritis in the clinic. Osteoarthritis provides an effective and safe program for the clinical treatment of knee osteoarthritis. Liu Xiaoxing et al.[7] used traditional Chinese medicine collapsing impregnation method combined with infrared irradiation to treat patients with wind-cold-dampness paralysis-type KOA, the control group was given conventional western medicine treatment, and the observation group added traditional Chinese medicine collapsing impregnation method combined with infrared irradiation therapy on the basis of the control group, and the VAS score of knee pain and the degree of swelling of the knee joint of the observation group were significantly lower than those of the control group, and the score of the knee joint function evaluation table was significantly higher than that of the control group, and the overall effective rate was significantly higher than that of the control group. The total effective rate was significantly higher than that of the control group. The patients' clinical efficacy, knee pain and swelling were improved.

2. Acupuncture therapy

2.1 Electroacupuncture

That is, combined with modern bioelectricity principle, on the basis of ordinary acupuncture, the pulse current output of electroacupuncture instrument through the wire connected to the needle handle, the use of rhythmic stimulation of electric current instead of or auxiliary to the traditional needle manipulation, to achieve the dredging of meridians and collaterals, analgesia and antispasmodic, regulating physiological function of the therapeutic method. Hu Guiyan et al [8] randomly divided 90 cases of KOA patients into a control group and a study group, the control group received rehabilitation exercise training, and the study group was combined with electroacupuncture treatment on the basis of the control group. It was found that electroacupuncture could effectively alleviate clinical symptoms and improve blood rheology indexes of KOA patients, and the mechanism of action may be through the regulation of TLR4/MyD88/NF-κB signaling pathway in peripheral blood mononuclear cells. Zhou Liang orn et al[9] treated KOA with cold-damp paralytic obstruction, in which the control group was treated with conventional rehabilitation therapy, and the electroacupuncture group applied electroacupuncture to the points of yin-shi, blood sea, upper blood

sea, calvarium, liangqiu, foot-sanli, inner knee-eye, and yinlingquan. After treatment, it was found that the serum inflammatory indexes IL-6 and TNF-α of the electroacupuncture group were lower than those of the control group, while TGF-β1 was higher than that of the control. Electroacupuncture treatment for KOA patients has remarkable efficacy, which can effectively improve the patients' three-dimensional gait performance, reduce the inflammatory response, and promote the recovery of knee joint function. Hu Zhe et al [10] studied the effect of their electroacupuncture on the rabbit model of knee osteoarthritis on its intestinal flora, electroacupuncture stimulation of the Sea of Blood, Yinlingquan and Calvary on 32 AA model white rabbits, and found that Chao1 index and Shannon index of the electroacupuncture group of white rabbits were elevated ($P<0.05$), and some of the beneficial bacterial abundance in the electroacupuncture group rose, and some of the conditionally pathogenic bacterial abundance declined ($P<0.05$), thus Electroacupuncture can alleviate knee osteoarthritis by affecting the structure and abundance of intestinal flora in rabbit model of knee osteoarthritis. Chen Xiaoting et al [11] used electroacupuncture to stimulate two acupoints of calvarium nose and inner knee eye in the rabbit KOA model of papain manufacture and found that electroacupuncture may play a role in alleviating cartilage damage and reducing inflammatory response by up-regulating the expression of HIF-1α and SOX-9, decreasing the expression of MMP-1, MMP-13, TNF-α, and IL-1β, and increasing the formation of type II collagen.

2.2 Fire needles

That is, the therapeutic method of heating in the flame until red, followed by rapid stabbing into specific points or lesions in the human body, utilizing the high temperature stimulation of the needle body in order to achieve the therapeutic purpose. Lan Pingying et al [12] used fire needling to puncture the joint cavity by injecting 4% papain into the bilateral calvarial and internal knee-eye points of model rats for treatment. After treatment, it was found that the growth rate of body mass in the fire-acupuncture group was higher than that in the model group ($P<0.05$), so fire-acupuncture could inhibit cartilage degeneration and improve KOA symptoms. Fire-acupuncture may inhibit the expression of Wnt-4 and β-catenin proteins, modulate the down-regulation of Wnt/β-catenin signaling pathway and reduce the degradation of cartilage extracellular matrix type-II collagen and proteoglycans, and inhibit the degradation of rat knee bone collagen and proteoglycans. Inhibit cartilage degeneration in rat knee osteoarthritis. Zhao Yanxia et al [13] used Meta-analysis to analyze the efficacy and safety of simple fire-acupuncture in the treatment of osteoarthritis of the knee and its effect on inflammatory factors, using RevMan 5.4 software to perform Meta-analysis of the osteoarthritis index (WOMAC) scores, the treatment efficiency, the visual analog scoring method (VAS) scores of the knee pain, and the levels of interleukin-1 (IL-1) in the serum of the included studies. Meta-analysis. The results of the meta-analysis showed that fire-acupuncture therapy for knee osteoarthritis was superior to the control therapy in terms of lowering the WOMAC score, increasing the therapeutic efficacy, lowering the VAS score of knee pain, and lowering the serum interleukin-1 (IL-1) level. Therefore, it indicates that fire needle therapy is more prominent in improving the efficacy and safety of knee osteoarthritis. Chen Dan et al. [14] used fire-needle acupuncture combined with body pain and blood stasis soup to treat wind-phlegm stasis type knee osteoarthritis, and found that fire-needle acupuncture combined

with body pain and blood stasis soup could alleviate the clinical symptoms and pain of patients with wind-phlegm stasis type knee osteoarthritis, improve the function of the knee joints, regulate the level of inflammatory factors, and improve the quality of life, with a higher degree of safety.

2.3 Floating Needle

That is, the treatment method of sweeping and dispersing operation in the superficial subcutaneous layer through the special floating needle needle set, combined with prolonged needle retention, in order to quickly relieve soft tissue pain and dysfunction. Liu Xiaolin et al [15] randomly divided 72 patients with knee osteoarthritis into 36 cases each in the control group (conventional acupuncture combined with Zhengqing Fengqinning injection electroporation hole transdermal drug delivery group) and the experimental group (floating needle combined with Zhengqing Fengqinning injection electroporation hole transdermal drug delivery group). After treatment, it was found that the total effective rate was 91.4% in the floating needle combined with Zhengqing Fengqinning injection electroporation transdermal drug delivery group and 68.6% in the conventional acupuncture combined with Zhengqing Fengqinning injection electroporation transdermal drug delivery group, and the difference in the efficacy of the two groups was statistically significant ($P<0.05$). It is suggested that both treatment methods have efficacy on knee osteoarthritis, and the efficacy of floating needle combined with Zhengqing Fengqinning injection electrode hole transdermal drug delivery is better than that of conventional acupuncture combined with Zhengqing Fengqinning injection electrode hole transdermal drug delivery, which can effectively reduce the pain, and improve the function of the knee joint.

3. Moxibustion Therapy

3.1 Thermal moxibustion

That is, through the moxa heat stimulation of specific heat-sensitive acupoints in the human body (sensitive to moxa heat, easy to produce moxibustion sensation points), to stimulate heat penetration, expansion of heat, heat transfer, local heat (micro) heat far heat, surface heat (micro) heat, deep heat, non-thermal sensation, and other special reactions, so as to efficiently stimulate the operation of the meridian qi and to achieve the “qi to the place of disease” of the regulation of the sensitized moxibustion technology. Lei Zongheng et al [16] divided 90 cases of KOA patients into experimental group and control group according to the randomized numerical table, the control group was treated with sodium vitrate injection in the joint cavity, and the experimental group was treated with thermal moxibustion on the basis of sodium vitrate injection in the joint cavity, and the three acupoints with high frequency were taken as calf's nose, the inner knee eye, and the knee below the knee point. The results showed that the experimental group was better than the control group in improving the clinical symptoms of KOA patients, and its total effective rate was 93.02%. Fang Yuan et al[17] treated AA rabbits with thermal moxibustion, and found that the serum inflammatory factor content of IL-1β and IL-6 decreased in the model rabbit group after thermal moxibustion intervention, which showed that thermal moxibustion could improve the inflammatory response of KOA, and play an anti-KOA role

that may be related to the regulation of steroid degradation, ovarian steroidogenesis, retinol metabolism, etc.

3.2 Mild moxibustion

It is a therapeutic method of placing a lit moxa stick above the acupoints or specific parts of the human body, keeping a certain distance (usually 2-3 cm), and gently stimulating the acupoints through the heat of moxa, so as to produce a localized sense of warmth but not burning pain. Wei Wei et al [18] randomly divided 70 cases of cold-damp paralytic obstruction type KOA into control group and observation group, the control group was treated with electroacupuncture combined with celecoxib capsule, and the observation was added on top of this with spacer gentle moxibustion treatment, and it was found that the VAS scores and Chinese medicine symptom scores of observation group were significantly lower than that of control group ($P<0.05$), and the total effectiveness rate of the observation group was 88.89%, which was significantly higher than that of the control group of The total effective rate of the observation group was 88.89%, which was significantly higher than that of the control group ($P<0.05$), and the total effective rate of the observation group was 88.89%, which was significantly higher than that of the control group ($P<0.05$). It is believed that the combination of spacer gentle moxibustion and electroacupuncture in the treatment of cold-damp paralytic obstruction type KOA can rapidly relieve pain and restore joint movement, with remarkable clinical efficacy and no obvious adverse reactions.

3.3 Thunder fire moxibustion

That is, by combining the burning of special moxa sticks with herbal ingredients and using the heat, medicinal effect and infrared radiation produced by them to act on human acupoints or foci to achieve the effects of warming meridians and collaterals, dispelling wind and dispersing cold, and invigorating blood and removing blood stasis, and other effects of the treatment. Yin Zhenjun et al [19] used 40 cases of KOA oral celecoxib and 40 cases of KOA thunder fire moxibustion treatment for comparison, at the time of 1 month of treatment and 2 months of treatment, the observation group's Lysholm knee score, FMA scale score was higher than that of the control group and the NRS scale score was lower than that of the control group, and the thunder fire moxibustion group had a better performance in improving the knee joint function, relieving limb pain, and promoting the recovery of limb motor function than celecoxib group. Liu Simin et al. [20] treated 130 patients with wind-cold-damp paralysis type KOA, and added thunder fire moxibustion on the basis of ultrashort wave treatment, and found that the total effective rate was higher than that of the ultrashort wave treatment group, and the degree of swelling and pain of the knee joints of the patients were reduced significantly after treatment, and the therapeutic effect was remarkable.

4. Warm Acupuncture

The combination of acupuncture and moxibustion is a characteristic therapy in Chinese acupuncture and moxibustion therapy, in which the heat of moxa is conducted to the deeper layers of

the acupuncture points through the body of the needles to enhance the therapeutic effect. Wang Hu et al [21] utilized warm acupuncture and moxibustion together with external application of traditional Chinese medicine for the treatment of KOA and found that warm acupuncture and moxibustion could accelerate the absorption of inflammation, increase the level of autophagy, and slow down the process of KOA. Liu Zelin et al [22] randomly divided 128 patients with cold-earth, cold-dampness paralysis and obstruction of KOA into a control group and an observation group; the control group was treated with basic acupuncture, and the observation group was treated with "three needles and four acupuncture points" warm needle moxibustion on the basis of the basic acupuncture treatment. 0.05), and the observation group was significantly better than the control group in reducing the scores ($P<0.05$); the serum levels of IL-1β, TNF-α, and IL-6 indicators were reduced in both groups after treatment ($P<0.05$), and the observation group was significantly better than the control group in reducing serum inflammatory factors ($P<0.05$), which suggests that the treatment of "three needles and four points" with warm acupuncture and moxibustion for the treatment of chills and colds is a good choice for the treatment of chills and colds, which is a good idea. "Warm acupuncture and moxibustion treatment of knee osteoarthritis with cold-earth, cold-dampness paralytic obstruction can effectively reduce inflammatory indexes, improve patients' pain and dysfunction, and has a high degree of safety.

5. Conclusions

Knee osteoarthritis (KOA) is a common degenerative joint disease. It causes pain, swelling, deformity, stiffness and limited movement of the knee joint, and these symptoms seriously affect the patient's life and work. The treatment of KOA with external Chinese medicine is guided by the basic theories of Chinese medicine. After dialectical typing, various methods such as external application of traditional Chinese medicine, acupuncture and moxibustion are used. These methods are simple to operate, with remarkable efficacy and no toxic side effects. In recent years, some progress has been made in the external treatment of KOA with TCM. However, there are still deficiencies in the research of TCM on KOA, such as small sample size of clinical trials, lack of rigor in trial design, and lack of long-term follow-up and systematic tracking studies. Future studies should be devoted to conducting multi-center randomized clinical trials with larger sample sizes and more scientific rigor. Meanwhile, in-depth animal studies should be conducted to further clarify the pathogenesis of KOA. This will provide scientific evidence for the treatment of KOA with TCM and bring the advantages of TCM into play.

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