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Research Progress of Taibaiqiyao in Treatment of Bone and Joint Diseases

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Abstract: Taibai seven medicines are precious medicines unique to Taibai Mountain, most of which have the effects of promoting blood circulation and removing blood stasis, dredging meridians and relieving pain, removing dampness and swelling, dispelling wind and removing arthralgia, etc., specializing in the treatment of wind-cold-dampness arthralgia, traumatic injury, strain and strain, such as: Jinniuqi, Tieniuqi, Changchunqi, Fenxiangqi, etc. Through literature mining, the potential correlation of Taibai Qiyao in bone and joint diseases was summarized and analyzed, in order to provide new ideas for the pathogenesis of Taibai Qiyao in the treatment of bone and joint diseases, put forward new ideas for its targeted treatment drugs, and provide strong evidence for the clinical application of Taibai Qiyao in orthopedics.

1. Introduction

Bone and joint diseases refer to the diseases related to tissue, structure and function of bone and joint under the influence of various pathological factors. The main clinical manifestations are pain, dysfunction and deformity. The nature of the disease is mainly multiple, degenerative and proliferative [1]. Studies have shown that about 14 % of adults in the United States are affected by bone and joint diseases, and 23 % of the middle-aged and elderly people are affected by bone and joint diseases resulting in severe pain and limited mobility [2,3]. Osteoarthropathy has become the second leading cause of incapacity in men over 50 years of age in the United States after cardiovascular disease [4]. Osteoarthritis is the most common bone and joint disease. The health and quality of life of middle-aged and elderly people are seriously affected. The high-risk population tends to be younger [5].

With the over-exploitation of natural resources and the need for natural resources protection, the replacement of traditional rare medicinal materials has gradually entered people 's vision. Taibai seven drugs refers to the growth in Taibai area ' seven drugs ' general term. 'Seven drugs' was first recorded in 1590' Compendium of Materia Medica ' Volume 12 of the 'Sanqi', now China's 'Pharmacopoeia' income Taibai 'seven drugs' [6]. Taibai ' seven drugs ' widely used, unique function, has aroused widespread concern. At present, Taibaiqiyao clinical treatment of bone and joint

diseases unique effect, its basic research has been reported.

2. Taibai Seven Drugs

Taibai seven drugs, the most prominent manifestation is the 'four beams and eight columns' like Chinese medicine prescriptions in the principle of Junchen Zuoshi the same. Four Liang (Jun Liang) refers to: Taoerqi, Changchunqi, Jinniuqi, Tieniuqi, eight columns in the column refers to: corpse seven, Zhushaqi, Hongmaoqi, Panlongqi, Taibaisanqi, Zhugenqi, Fengweiqi, Zuozhu refers to: button seven, entertainment clam seven, frog seven, chase wind seven, buckwheat seven, Aerqi, Touguxiao, Shenjincao, see blood fly, Zhuquancao, Taibaiyangshen, so that the column refers to: screw seven, Huangsanqi, Huluqi, Jinmaoqi, flying ant clam seven, linen seven, Jiuniuqi, Huoxuedan, Biandanqi, Jusanqi, Daoziqi, Zushima, Pibayu, Xiaoliuyuehan, etc. [6].

Although many varieties of Taibai seven drugs, but its pharmacological effects are more concentrated, 'Taibai seven drugs' mostly have blood stasis, through the pain, dampness swelling, wind and other effects, specializing in wind and cold dampness Bi, bruises, strain, strain of disease, such as: Jinniuqi, Tieniuqi, Changchunqi, Fenxiangqi and so on. [7] Modern pharmacological studies have proved that the special efficacy of Taibai Qiyao in analgesia, anti-inflammatory, anti-rheumatism, anti-bacterial, anti-tumor, anti-viral and other aspects has attracted widespread attention. [6, 8, 9, 10]

3. Taibai Qiyao in Treatment of Bone and Joint Diseases

3.1. Taibai Qiyao and Osteoarthritis

Osteoarthritis is an inflammatory disease involving articular cartilage, subchondral bone, ligament, joint capsule, synovial membrane and other joint structures, which is mainly caused by articular cartilage damage or loss [11]. Osteoarthritis is characterized by progressive cartilage degeneration, and its clinical manifestations are swelling and pain, stiffness, fricative sound, and limited mobility [12]. Studies have shown that ginsenosides have a clear positive effect on restoring SOD activity and maintaining the synthesis of type II collagen in chondrocytes. Some Taibai Qiyao contain a large amount of ginsenosides, such as Zhuzishen [13-15] and Yuerqi [16]. To achieve relief and therapeutic effect. Duan et al. [17] proved through animal experiments that Tieniuqi had an effect on the activity of SOD in synovial fluid. Single Tieniuqi tincture could eliminate free radicals in synovial fluid, increase the activity of SOD in synovial fluid, and promote the recovery of knee osteoarthritis.

3.2. Taibai Qiyao and Rheumatoid Arthritis

Rheumatoid arthritis is a multiple autoimmune and systemic inflammatory disease with diverse clinical manifestations, mainly chronic and migratory joint pain, and often accompanied by repeated attacks, especially in the morning hand and foot joint stiffness is the most serious. The pathogenesis of RA is closely related to the immune response regulation system and the release of inflammatory factors [18,19]. Previous studies have shown that resveratrol can affect the function of the immune system by regulating IL-17 to interfere with the progression of rheumatoid arthritis, and even play a direct therapeutic role. Modern pharmacological studies have shown that the effective components of Taibaiqiyao contain resveratrol, such as peach seven. [9,20,21]

3.3. Taibai Qiyao and Osteoporosis

Osteoporosis is a systemic bone disease caused by the loss of nutrients and calcium ions, such as bone structure degradation, bone loss, and increased bone fragility. Clinically, there are often signs such as spinal shortening or deformity, and pain in the affected area, which can easily lead to complications such as compression fractures. Because of its high incidence and low treatment rate, it often leads to various complications, disability or death, and the prognosis is very poor. Therefore, early intervention and treatment should be carried out [22].

Bone metabolism is divided into bone formation and bone resorption, and osteoporosis is a disease developed under the condition that the long-term bone resorption rate is higher than the bone formation rate. Weng J et al. [23] have demonstrated that Wnt3a, a downstream protein of the Wnt signaling pathway, enhances bone formation by promoting the differentiation of bone marrow mesenchymal cells into osteoblasts. Qin X et al [24] confirmed that RUNX2 protein downstream of Wnt / β-catenin signaling pathway can enhance bone formation rate by promoting osteoblast synthesis of bone matrix. Yang Sen et al. [25] through animal experiments confirmed that centipede flying seven can regulate the Wnt / β-catenin signaling pathway to improve the function of osteoblasts and enhance bone formation rate. Pan et al. [26] confirmed through animal experiments that Aralia taibaiensis can increase the expression of Wnt3a, β-catenin and RUNX2 proteins by regulating the Wnt / β-catenin signaling pathway, thereby enhancing bone formation rate. Wnt signaling pathway can weaken bone resorption rate through its downstream Wnt3 a protein and Wnt16 protein. Wnt3 a protein can inhibit osteoclast formation by regulating RANKL expression, and Wnt16 protein can enhance osteoclast differentiation [27]. At the same time, Li et al. [28] have shown through animal experiments that the extracts of Feitian Wugongqi and Zhuzishen in Taibai Qiyao can promote the proliferation, differentiation and mineralization of osteoblasts. Flying centipede seven and pearl ginseng have synergistic effect on osteoblasts. When the dose ratio of flying centipede seven and pearl ginseng is 1: 2, the synergistic effect is the best. Ni et al. [29] analyzed the fat-soluble components of Changchunqi by GC-MS, and the main components contained osthole. Osthole can regulate the function of osteoblasts by reducing the mRNA expression of NO, IL-1, IL-6 and IL-6 produced by osteoblasts spontaneously or under the stimulation of inflammatory cytokines and LPS [30], and can also promote the proliferation of osteoblast-like cells UMR106 cells and stimulate alkaline phosphatase activity, which has a direct effect on promoting the proliferation and differentiation of osteoblasts [31]. Therefore, Taibai Qiyao can slow down the progress of osteoporosis by promoting osteoblast proliferation, differentiation and mineralization.

3.4. Taibai Qiyao and Hyperosteogeny

Hyperosteogeny is a series of almost irreversible compensatory pathological changes caused by long-term effects of articular cartilage degradation, endocrine disorders and other factors. The clinical manifestations are often joint pain and numbness, limited activity, and often involving peripheral blood vessels and nerves, aggravating pain and local muscle atrophy. It is a common multiple degenerative metabolic disease in orthopedics. [12] Hyperosteogeny has been shown to be associated with the immune system (TNF-α, IL-1, etc.)

Humoral metabolism, cytokines (TGF, NGF, Wnt signaling pathway, etc.) and substance metabolism are directly related. Some effective pharmacological components contained in Taibaiqiyao [8], such as quercetin, luteolin, triterpenoid saponins, etc. [32-34], can regulate immune system function, cytokine levels and substance metabolism by regulating blood lipids, anti-oxidation, anti-inflammatory (IL-1, TNF-α) and other pathways, [35] and ultimately achieve the purpose of affecting bone hyperplasia. [36]

4. Conclusion and prospect

In summary, the pathogenesis of bone and joint diseases is mainly caused by immune system, cytokines, energy metabolism and other factors, and Taibai Qiyao can promote osteoblast proliferation, restore SOD activity and maintain chondrocyte synthesis of type II collagen, regulate IL-17, by regulating blood lipids, anti-oxidation, anti-inflammatory (IL-1, TNF-α) and other ways to systematically intervene. The mechanism of bone and joint diseases is complex, which is related to the multi-component, multi-target and multi-channel treatment characteristics of traditional Chinese medicine, which is also the characteristics and advantages of traditional Chinese medicine in treating diseases. Taibai Qiyao has the advantages of abundant production and shorter culture cycle than commonly used precious Chinese medicine. Therefore, Taibai Qiyao can be used as a medicinal material for the treatment of bone and joint diseases. However, the specific pathogenesis of bone and joint diseases is not clear enough, and the specific compatibility and dosage of Taibaiqiyao in clinical application still need further study. Therefore, a large number of in vivo and in vitro experiments are still needed for further study.

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