

# Treatment of Bone Hyperplasia from the Perspective of Spleen and Kidney with *Atractylodes Macrocephala* as the Main Method

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**Abstract:** Bone hyperplasia is a degenerative disease that is inevitable during the aging process of the human body, with the continuous thickening of bone joints and their soft tissues. Pressing on other tissues causes pain and numbness. With the development of modern medical research, it has been found that "*Atractylodes macrocephala*" has many functions such as anti-inflammatory, anti-aging, and improving immune function. This article mainly discusses the treatment of bone hyperplasia based on "cultivating soil to make water" and "*Atractylodes macrocephala*", providing a theoretical basis for clinical treatment.

**Keywords:** Soil cultivation for water; *Atractylodes macrocephala*; Bone hyperplasia; The spleen and kidney

## 1. Introduction

Bone hyperplasia is a degenerative disease of bone itself, which is more common in elderly patients. When it is compressed to other tissue structures or peripheral nerves, it causes corresponding symptoms such as pain, numbness, swelling, and limited joint activity, which seriously affects the quality of life and work of patients. It can be confirmed by X-ray, CT, MRI and other auxiliary examinations [1]. Western medicine uses calcium supplement, physiotherapy, anti-inflammatory analgesic drugs and surgical treatment to treat, although it can temporarily relieve symptoms, but still not achieve satisfactory [2]. This disease belongs to traditional Chinese medicine "bone overflow", "Bi syndrome", "bone bi" and other categories. Based on the theory of the five elements theory of "cultivating soil to make water", this article uses *Atractylodes macrocephala* to treat the disease from the spleen and kidney in order to provide a new idea for the prevention and treatment of bone hyperplasia.

## 2. The understanding of "white art" in ancient and modern times

*Atractylodes macrocephala*, the dried tuber of the chrysanthemum family plant *Atractylodes macrocephala*, has bitter, sweet and warm medicinal properties. Spleen, stomach channel. Sweet light dampness, warm bitter and dry, it is the essential medicine for the spleen family. "Shu" is a commonly used medicine by Zhang Zhongjing, listed as the top grade of the "Shennong Materia Medica Classic", saying that it can treat wind cold dampness, necrotic muscles, spasms, and sores, as well as stop sweating, reduce fever, and aid digestion. If used for decoction into pills, long-term use can make the body light, prolong life, and not feel hungry. It refers to the treatment of arthralgia, muscle death, spasms, jaundice, etc. through the use of the "technique" of strengthening the spleen and drying dampness. The "Treatise on Medicinal Properties" states: "The taste is sweet and spicy, without toxicity. The "Materia Medica Meng Quan" states: "It is beneficial for the heart, spleen, stomach, three jiao, and four meridians." As Li Zhongzi said in "The Essence of Materia Medica", "There is no better medicine for nourishing the spleen and stomach than it [3]. As an essential medicine for postnatal nourishment, not only can it exert great effects when used alone, but it can also be combined with other drugs to achieve the desired therapeutic effect. For example, when used together with cooling and nourishing herbs, it is good at nourishing the lungs. Used together with Shengsan medicine, good at regulating the liver. Used together with nourishing yin medicine, it is good at tonifying the kidneys. Therefore, it can also benefit the four organs of the heart, liver, kidneys, and lungs.

With the in-depth study of modern medicine on *Atractylodes macrocephala*, it has been found that it contains volatile components, polysaccharides, lactones, flavonoids, glycosides and other pharmacological components, and can exert various effects such as anti-tumor, anti-inflammatory and analgesic, liver protection, antibacterial, immune regulation, and water metabolism regulation [4]. Polysaccharide PAM can enhance anti-tumor response and immune function by promoting the maturation of T lymphocytes and increasing macrophage function [5]. Ji Guangquan [6] detected the phagocytic function induced by *Atractylodes macrocephala* polysaccharides through various cell techniques and found that it was positively correlated with MAPK and NF- $\kappa$ B. It can promote the release of cytokines and bioactive substances, thereby exerting immune regulatory effects. The anti-inflammatory effect is achieved by inhibiting MAPK and NF through Atractylolide I and Atractylolide III- $\kappa$ . The activation of B is achieved. Differentiation and maturation of dendritic cells in the immune system. Polysaccharides from *Atractylodes macrocephala* promote IL-12 and TNF- $\alpha$ . The secretion of TLR4 is related to increased expression of TLR4. As the first essential medicine for tonifying qi and strengthening the spleen, it plays an important role in the repair of the spleen and stomach. Studies [7] have found that *Atractylodes macrocephala* polysaccharides promote cell migration and adhesion to junction proteins through polyamines and calcium ion regulation, thereby protecting the gastrointestinal mucosa. Xu Pingcui [8] et al used GC-MS fingerprint analysis, it was found that Atractylone is the main component in the volatile oil of *Atractylodes macrocephala*, it can directly or indirectly enhance antioxidant activity. Research has shown [9] that applying *Atractylodes macrocephala* decoction to the affected area can significantly reduce TNF in the serum of inflammatory mice- $\alpha$ . Tumor necrosis factor, through chemotaxis of neutrophils and monocytes, activation and degranulation, release of inflammatory mediators, suggesting that it may be related to the anti-inflammatory effect of *Atractylodes macrocephala*. Qingjun Zhu et al. [10] found through experiments that different doses of water extracts from *Atractylodes macrocephala* can increase the thymic index of S180 tumor bearing mice, and reduce TNF in plasma- $\alpha$  And IL-2 levels can regulate immune function to inhibit tumor growth. The best effect is achieved with a medium dose.

### 3. Modern medicine on the understanding of bone hypertrophy

Clinically, bone hyperplasia, also known as proliferative osteoarthritis and osteoarthropathy, is a degenerative joint disease caused by long-term cartilage degradation. Hyperplasia can occur in any joint of the human body, with the highest incidence of knee joint hyperplasia [11]. Pathologically, bone hyperplasia is mainly irregular damage to cartilage and synovitis to varying degrees. The histological manifestations were chondroclastic, cell proliferation, destruction, necrosis, etc. In biomechanics, it refers to the increase of water in the cartilage, causing swelling and bone hardening. Nutritionally speaking, the most fundamental cause of bone hyperplasia is the lack of calcium [12].

With the continuous development of modern technology and medical level, there are various treatment methods for bone hyperplasia, such as iontophoresis, direct current drugs and etc. The direct current drug ion introduction method is more effective in treating bone hyperplasia, and the effectiveness of this method is limited due to the fact that the imported drug is liquid, volatile, and not long-lasting. Ultraviolet therapy mainly plays a role in anti-inflammatory, bactericidal, and pain relief, promote wound healing and the production of vitamin D3, mediate the immune function of the body, etc. At present, there is no effective treatment drug for this disease in Western medicine. Generally, targeted treatment is supported. If you feel pain, you can take some antipyretic and analgesic drugs. People who are numb can choose B-group vitamin drugs. For those with joint swelling and fluid accumulation, local extraction of fluid or local drainage can be given blocking and other therapies. However, practice has proven that the treatment methods for bone hyperplasia are not ideal, it only addresses the symptoms rather than the root cause, and is prone to recurrence of the condition. Surgical treatment is not the preferred treatment for bone hyperplasia. When conservative treatment is ineffective and the condition is severe, which seriously affects the patient's life, surgical treatment of bone hyperplasia can be considered [13]. During treatment, it is important to pay attention to diet and correct bad postures, take appropriate sunbathing to promote the absorption of calcium by the bones. At the same time, it is also necessary to avoid long-term vigorous exercise, reduce bone wear, and thus reduce the prevention of bone hyperplasia [14].

### 4. Chinese medicine on the understanding of bone hypertrophy

The Huangdi Neijing is one of the ancient medical classics in China, in which the term "bone obstruction" first appeared. The symptom of kidney obstruction is finger bone obstruction. The "Suwen Long Sting Jie Lun" states: "When the body experiences bone related diseases, the bones will feel heavy and unable to be lifted, and the bone marrow will feel sore. At the same time, there will also be invasion

of cold air, which is called bone blockage". The main idea is that the pathogenic factor is located in the bone, causing the limbs to be heavy and unable to lift, deep in the bone marrow feeling soreness and pain, and the cold wind piercing the bones. According to the "Lingshu Qixue Lun", "When cold energy accumulates inside the body and cannot dissipate, it prevents the normal operation of Rongwei Qi and blood, leading to muscle contraction, muscle contraction, and inability to extend ribs and elbows". This condition is called bone blockage. The "Zhongzang Jing" states: "Generally speaking, when evil spirits such as wind, cold, heat, and dampness enter the bones, they will cause bone arthralgia." This indicates that wind, cold, and dampness are important causes of arthralgia. In addition, the "Treatise on the Origin of Various Diseases" by the Chaoyuan Fang states: "People who encounter arthralgia in winter are referred to as bone arthralgia, where bones feel heavy and cannot be lifted, and there are also symptoms of pain." The "Su Wen Bi Lun" points out that if there is insufficient positive energy and evil invades the bone marrow, symptoms such as bone pain, paralysis, and limb weakness are manifested. In traditional Chinese medicine, although there is no exact name or explanation for bone hyperplasia. However, when bone hyperplasia stimulates and affects surrounding nerves, muscles, and other tissues, it can cause symptoms such as pain, numbness, and poor flexion and extension, the symptoms described by "bone Bi" and "bone overflow" are mostly similar. Therefore, it is classified as a "bi syndrome" in traditional Chinese medicine. This disease is often caused by liver and kidney deficiency, insufficient qi and blood, resulting in the loss of nourishment of muscles and bones, obstruction of qi and blood circulation, and the invasion of wind, cold, and dampness, causing pain [15].

Traditional Chinese Medicine has many methods for treatment [16]. Internal treatment mainly involves taking traditional Chinese medicine orally. The external treatment mainly includes traditional Chinese medicine fumigation and washing, external application, acupuncture, massage, moxibustion, etc. In clinical practice, internal and external combination therapy is often used, and single therapy can also be used. Traditional Chinese medicine has a long history, medical experts from various dynasties have unique insights into "Bi syndrome", "Dialectical treatment" is the most fundamental principle in the treatment of diseases in traditional Chinese medicine, and different treatment principles can be implemented based on different syndromes. Wu Zhiquan [17] et al. used acupuncture combined with massage therapy to treat 125 patients with lumbar spine bone hyperplasia. The clinical cure rate was 70.4%, the improvement rate was 25.6%, and the total effective rate was 96%. The author believes that acupuncture can have the effects of dispelling wind, dispersing cold, relieving pain, promoting blood circulation, and resolving blood stasis, combined with local massage and pressure therapy, not only can the effect of acupuncture be enhanced. Eliminate inflammatory factors, alleviate spasms, and then relieve pressure on nerve roots, alleviating pain. Jin Zhaofeng [18] applied our hospital's experience and prescription to treat 217 patients with lumbar spine hyperosteoecy with a course of 2-3 years, based on the principles of tonifying the kidney, promoting marrow, strengthening bones, promoting blood circulation, relaxing tendons, and relieving pain. The total effective rate was 98.16%. Traditional Chinese medicine believes that the main pathogenesis of this disease is kidney essence deficiency. Prolonged illness and old and weak physical condition can lead to kidney qi decline, insufficient essence and blood, inability to nourish muscles and bones, stagnation of qi and blood, and inability to clear muscles and veins, resulting in low back pain. Therefore, in the formula, ripe ground is used to nourish blood, nourish yin, and nourish essence and marrow. Cistanche deserticola, epimedium, and bone fragments are used to nourish the liver and kidney. Frankincense, myrrh, dragon's blood, and cauliflower are used to promote blood circulation, relax tendons, and relieve pain. Roasted semen Strychni has a more significant analgesic effect by clearing collaterals and dispersing knots. Eucommia ulmoides is used for treating lumbar and spinal pain, tonifying the middle and nourishing qi, strengthening muscles and bones, thereby making the efficacy more pronounced. Zou Shiguang [19] et al. treated patients with bone hyperplasia (located in the neck, waist, knee, calcaneus, etc, with a combination of internal administration of Yishen Activating collaterals Formula and external application of anesthesia formula. After two courses of treatment, the effective rate was 82.9%, and the total effective rate was 94.7%. Internally, it mainly nourished the liver and kidney, strengthened tendons and bones, dispelled wind, promoted collaterals, and dissipated blood stasis. The external method was to relieve pain and dampness, warm meridians and activate collaterals, and remove blood stasis and promote blood circulation. Research has shown that combining internal treatment with external treatment can produce remarkable results.

## 5. The relationship between bone hyperplasia and kidney

The Yellow Emperor's Internal Classic states: "The kidney governs the bones, stores essence, and produces marrow and nourishes the bones". Traditional medicine believes [20] that the kidney is the innate foundation, responsible for bone and marrow production, storing essence, and possessing the basic characteristics of human formation. The "Six Sections of Viscera Elephant Theory" also states: "Kidney can nourish bones." The "Simple Questions: The Essence of Pulse" says: "The bone marrow is filled in the bone." It is pointed out that bones are the scaffolding of the human body, supporting the entire body.

The essence hidden within the bone can provide the energy needed for bone growth and development, playing a nourishing role in the bone. Therefore, the strength of bones is closely related to the degree of bone marrow filling, which depends on the nutrition of the bone marrow. With the continuous exploration and enrichment of the scientific connotation of the theory of "kidney storing essence" in modern Chinese medicine, it has been found that "kidney" has a regulatory effect on the metaplasia, maintenance, and repair of articular cartilage. The innate essence stored in the kidney is an important condition for the metaplasia of articular cartilage, and the concept of stem cells was introduced in the "kidney essence" theory, believing that adult stem cells and innate essence have similar properties, while embryonic stem cells and acquired essence have similar properties<sup>[21]</sup>. The Complete Book of Jingyue states: "For people who have been working hard for a long time and have weak kidney qi, they often experience symptoms of weak waist and knees, unable to withstand excessive fatigue". According to "Su Wen • Jin Kui Zhen Shi", "essence is stored in the kidneys. When essence is damaged, symptoms of lower back pain and soreness may occur, and the kidneys are in charge of the bones... Therefore, it can be known that diseases exist in the bones. If there is an internal disease, it will inevitably manifest externally. For example, when kidney yang deficiency is external, it manifests as cold pain in the waist and knees, chills in the lower limbs, and mental fatigue. Kidney yin deficiency is manifested externally as soreness and pain in the waist and knees, dizziness, tinnitus, forgetfulness, and tooth loss and hair loss. Kidney essence deficiency is often manifested externally as delayed closure of the fontanelle in children, weakness of the bones, and delayed erection and walking. The book "Su Wen • Five Organ Generation Chapter" states: "The kidney is the foundation of bone. When bone blockage suddenly occurs, it will be attacked again by evil energy, further affecting the kidneys". Therefore, it is believed that the external manifestations of bone hyperplasia are rigidity of the neck and back, dull and dull pain in the lower back, heel pain, and soreness in the lower back and knees, while the internal factors are caused by kidney deficiency<sup>[22]</sup>.

## 6. The relationship between bone hyperplasia and spleen

The book "Lingshu Meridians" states: "Bones are like the main support points of the human body." The "Extracorporeal Compilation" states: "The limbs are like the extension of the spleen." It is pointed out that bones are the backbone that supports and maintains morphology, while limbs require spleen and spleen health to maintain their normal functional activities. From the perspective of human anatomical structure<sup>[23]</sup>, bones are the main carrier of vertical force in the human body, horizontal support must rely on muscle coordination and cooperation to complete various forms of movement. If the body's Qi and blood flow cannot nourish muscles, it will cause the balance between bones and flesh to be disrupted. In order to achieve self-balance and adapt to the self-system, protrusions will deliberately grow at the junction of bones. These protrusions are called bone hyperplasia. The book "Su Wen • Generation of the Five Zang Organs" states: "The spleen is responsible for transporting the essence of water and grain to nourish muscles." Li Dongyuan's "Spleen and Stomach Theory: Spleen and Stomach Prosperity and Decline Theory" states: "If both the spleen and stomach are strong, they can digest and absorb nutrients. If both the spleen and stomach are weak, they cannot digest food and become thinner... Spleen deficiency can lead to muscle depletion." Not only does it demonstrate the important correlation between the spleen governing the flesh and human body morphology, but it also points out the importance of the spleen governing the movement and transformation of the body. The spleen and stomach are the source of qi and blood biochemistry, and the nourishment and fullness of muscles require the water and grain essence transported by the spleen to nourish. Only when the muscles and muscles are strong and powerful can the bones maintain the body stably. Therefore, the spleen and kidneys are strong, and the bones and flesh are strong. So, the occurrence of bone hyperplasia is also closely related to the spleen.

## 7. "Cultivating Soil to Make Water" - Bone hyperplasia

"Cultivating soil to make water" is a governance principle formulated based on the law of the five elements' mutual restraint. The term "water" here not only refers to water dampness and dampness evil. It also refers to the kidney corresponding to the water of the five elements, and this treatment also refers to the relationship between the spleen and kidney. It was first advocated in the Yellow Emperor's Inner Canon, and its application was first highlighted in the Treatise on Febrile Diseases and Miscellaneous Diseases. It was first mentioned in the General Records of Shengji. After multiple periods of gradual improvement, it has been widely used by modern doctors in various internal medicine miscellaneous diseases. The theory of "cultivating soil to make water" should not only strengthen the spleen and make water, but also include "warming yang and promoting water", "absorbing kidney qi", and so on. The actual meaning is to restore normal water metabolism and kidney function by regulating the functions of organs such as the spleen and soil. Expanded the practical thinking of clinical treatment. The "Spleen and Stomach Theory • Spleen and Stomach Prosperity and Decline Theory" states: "The retrograde flow of kidney water invades the spleen and stomach, leading to dysfunction of the spleen and stomach."

Manifestations include increased saliva and nasal mucus, excessive saliva, and urine, while also feeling cold. Emphasizing that kidney disease is affected by pathogenic factors and can lead to soil invasion, therefore, this disease should be treated based on the spleen and kidney [24]. The "Yellow Emperor's Internal Canon - On the Generation of the Five Zang Organs" states: "The kidneys and bones cooperate with each other, governing the hair and also restricting the spleen." The term "subject" here actually means restraint, that is, mutual restraint. Due to the fact that there is life in the gram and biochemistry in the system, it is called the main. The Compendium of Materia Medica cites Zhang Rui's "Ji Feng Bei Ji Fang": When you notice that teeth are gradually growing and making it difficult to chew food, this condition is called myelorrhea, you can rinse your mouth with *Atractylodes macrocephala* Tang and immediately recover. The kidneys are in charge of the bones, and teeth are a part of the bones. It indicates that there is a malfunction in the system that suppresses the bone marrow. Using the five elements complement each other, soil overcomes water, and spleen deficiency cannot restrict water, resulting in bone marrow overflow [25]. The "Treatise on Ancient and Modern Famous Medical Formulas" states: "The spleen is regulated by water, while the kidneys are the place where water operates." According to the principle of mutual restraint and basic governance, 'strong will suppress it, weak will support it', it is necessary to suppress the passage of the kidney by tonifying the spleen. Kidney belongs to water, spleen belongs to soil, and soil can control water. Kidney water overflow is related to spleen soil. Soil deficiency cannot control water, so soil cultivation is used to make water. *Atractylodes macrocephala*, as a necessary medicine for nourishing soil, plays a crucial role in the treatment of bone hyperplasia by making water. Wang Junao [26] et al. applying the five elements of health and cure principle, and use 500g of *Atractylodes macrocephala* externally to fumigate and wash the affected area. By using the method of fumigating and washing the affected area with drugs, the drug can directly reach the disease, thus achieving the goals of anti-inflammatory, analgesic, blood circulation, and collaterals. After 3 weeks of continuous treatment, the patient's tenderness at the affected area was significantly reduced and their walking was basically unrestricted. The total effective rate is 83.72%. Jia Chuan [27] et al. divided 60 elderly patients into the experimental group and the control group. The experimental group was treated with self-made prescription and reused 20g of *Atractylodes macrocephala* while the control group was treated with oral cecoxib. Two months of follow-up after treatment showed significant improvement in pain in both groups of patients, with no significant difference in VAS score, JSSF score, and FADI score. Gong Yingshun [28] et al. treated cervical and lumbar vertebrae hyperplasia by making single ingredient *Atractylodes macrocephala* powder into medicine, and treated knee joint bone hyperplasia by boiling *Atractylodes macrocephala* powder and fumigating the affected area. The total effective rates of bone hyperplasia in the cervical spine, lumbar spine, and knee joints were 93.1%, 85.7%, and 83.3%, respectively. There has been a significant improvement in the patient's illness.

## 8. Summary

Bone hyperplasia is a physiological process in which the body adapts and protects itself. At first, the patient did not feel any discomfort and did not pay attention. But once discomfort symptoms such as pain and numbness are caused, most Western medicine can only solve them through surgical treatment. Sometimes the postoperative trauma is even greater than the proliferation itself. Compared to Western medicine treatment, traditional Chinese medicine's "syndrome differentiation and treatment" can directly reach the disease site, allowing patients to be cured without suffering from surgery. According to the principle of mutual generation and restraint of the five zang organs, treating bone hyperplasia from the spleen and kidney. As the foundation of succession, the kidney and spleen are closely related to the growth and development of bones. There are more and more clinical cases of using single flavored *Atractylodes macrocephala* or reusing *Atractylodes macrocephala* to treat various bone hyperplasia. However, the clinical mechanism of its treatment for bone hyperplasia is still unclear, and it is worth further exploration. From the perspective of traditional medicine, the treatment of "cultivating soil to make water" provides new ideas and methods for the prevention and treatment of bone hyperplasia in traditional Chinese medicine in clinical practice.

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