

Clinical Application and Experimental Research Progress of Huo-Luo-Xiao-Ling-Dan in Orthopedics and Traumatology

Yinghua Hao¹, Yingang Li^{1,2,*}

¹Shaanxi University of Chinese Medicine, Xianyang 712000, Shannxi, China

²Affiliated Hospital of Shaanxi University of Chinese Medicine, Xianyang, China

*Corresponding author: liyingang9633@163.com

Abstract: *Huo-Luo-Xiao-Ling-Dan (HLXLD) comes from the famous doctor Zhang Xichun's "Intergrating Chinese and Western Medicine". The prescription has the function of promoting blood circulation and dredging collaterals, removing blood stasis and generating new blood, relieving swelling and pain. It is often used in the orthopedic department of Traditional Chinese medicine for the treatment of swelling and pain caused by qi and blood stasis caused by trauma or internal injury. And the prescription often has the effect of "simple, convenient, cheap and effective". It has good curative effect for many orthopedic diseases such as acute lumbar sprain, lumbar disc prolapse, rheumatic lumbago, knee osteoarthritis, fractures and postoperative complications. This paper reviews the efficacy of HLXLD based on the theory of blood stasis in Chinese medicine, combined with the clinical application and experimental studies of HLXLD in recent years, in order to provide reference for the treatment of orthopedic diseases.*

Keywords: *Huo-Luo-Xiao-Ling-Dan (HLXLD), traditional Chinese medicine, treatment of orthopedic diseases, overview*

1. Introduction

Traditional Chinese medicine believes that the common pain in orthopedic diseases is mostly due to qi and blood damage, trauma or internal injuries often produce blood stasis, block meridians, resulting in blood stasis and qi stagnation, resulting in pain. Zhang Xichun, a famous doctor in the late Qing Dynasty, had an effective prescription called Huo-Luo-Xiao-Ling-Dan (HLXLD), which was composed of four herbs: Chinese angelica root, salvia miltiorrhiza, olibanum and myrrh. The prescription has the function of promoting blood circulation and dredging collaterals, removing blood stasis and generating new blood, relieving swelling and pain. In the orthopedics department of traditional Chinese medicine, it is often used to treat swelling and pain caused by qi and blood stasis caused by trauma or internal injury. Through clinical study and practice, as well as reviewing relevant literatures of clinical studies in recent years, the author found that this prescription has significant curative effect on a variety of orthopedic diseases, and can effectively relieve patients' discomfort symptoms such as swelling and pain. Therefore, it is more and more widely used. Based on the theory of blood stasis in traditional Chinese medicine, this paper reviewed the clinical application and experimental research progress of HLXLD in orthopedics.

2. The development of blood stasis theory in Chinese medicine

The theory of blood stasis in Traditional Chinese medicine (TCM) has a long history of development. It is accumulated and formed in the ancient working people's long-term struggle with diseases, and has experienced a gradual development process from shallow to deep. It is an important part of TCM understanding of the etiology and pathogenesis of diseases. We can find the records of treating "blood stasis" related diseases from the ancient books such as Zuo Zhuan and fifty-two Prescriptions for Diseases. And in the Spring and Autumn period and the Warring States period, people had a further understanding of the disease caused by blood stasis, and the embryonic form of blood stasis theory gradually formed. Huangdi Neijing (The Yellow Emperor's Internal Classic) made a detailed exposition of the etiology, pathogenesis and treatment of blood stasis, and opened the door to the theory of blood stasis [1-2]. Some of the Chinese herbs proposed in Shennong Bencao Jing (Shennong's Classic of Materia Medica) have been described as having the effects of "eliminating blood stasis", "eliminating extravasated blood" and

"eliminating stagnated blood", which lays a pharmacologic foundation for the development of blood stasis theory. In his *Shang Han Za Bing Lun* (treatise on febrile and miscellaneous diseases), the medical sage Zhang Zhongjing summarized the law of syndrome differentiation and treatment of blood stasis syndrome and the characteristics of prescription medicine before the Han Dynasty, and clarified the name of "blood stasis" for the first time, which further enriched the theory of blood stasis, and had a great influence on the understanding of blood stasis theory by doctors in later generations, and played a link between the past and the future [3]. Since then, the theory of blood stasis has been continuously developed and perfected by doctors in later dynasties. In the late Qing Dynasty, Wang Qingren's *Yi Lin Gai Cuo* (Correcting the Errors in the Forest of Medicine) and Tang Rongchuan's *Xue Zheng Lun* (Treatise on Blood Evidence) inherited and creatively developed the theory of stasis of blood in Chinese medicine, and the research on the treatment of blood circulation and stasis has reached a new height, which made great contributions to the theory of stasis of blood in both theory and practice, making the theory of stasis of blood in Chinese medicine finally complete [4].

3. Relevance of blood stasis theory to orthopedic and traumatic diseases in Chinese medicine

In the *Yellow Emperor's Classic of Internal Medicine*, there are descriptions of the causative factors of injuries such as "heavy lifting", "falling" and "injuries caused by five strains". *Jingui YaoLue* (Synopsis of Prescriptions of the Golden Chamber) is a condensation of the causes of disease: "A thousand disasters, but not more than three. One, the meridians by the evil, into the internal organs, for the internal cause; two, the limbs and nine orifices, blood transmission, Yong plug inaccessible, for the external skin in also; three, room, gold blade, insect and animal injuries"[5]. Chen Wuzhe of the Song Dynasty further pointed out that the etiology of injury is different from the internal causes of the seven emotions and the external causes of the six lewdnesses, and should be classified as not internal and external causes, which are caused by both internal and external causes intermingled and intertwined together [6]. Ji Shunxin found through the combing of ancient Chinese medical literature that most physicians recognized the pathogenesis of orthopedic injuries as internal stagnation of blood stasis and excessive death of blood, and the treatment of orthopedic injuries was mostly based on the identification of qi and blood, supplemented by the identification of the eight syndromes [7]. According to the *Yellow Emperor's Classic of Internal Medicine*, the pathogenesis of traumatic swelling and pain lies in "qi hurts pain, form hurts swelling" and "if the pain comes first and then swells, qi hurts form; if the swelling comes first and then hurts, form hurts qi", which also indicates that most of the orthopedic diseases in Chinese medicine with swelling and pain symptoms hurt qi and blood. "If there is no circulation, there is pain". After trauma or internal injury, blood stasis is often formed, blocking the meridians and causing blood stasis and qi stagnation, resulting in swelling and pain.

4. The understanding of HLXLD in Traditional Chinese medicine

HLXLD comes from *Yi Xue Zhong Zhong Can Xi Lu* (A book on Chinese medicine with references to Western medicine) written by Zhang Xichun, a famous doctor in the late Qing Dynasty[8]. This recipe is made up of four Chinese herbs: Chinese angelica root, salvia miltiorrhiza, olibanum and myrrh. Zhang's analysis of this recipe when he said that "HLXLD is good to enter the blood, through the meridians", "treatment of qi and blood stagnation, eliminate the bump and obstruction, treat the pain in the heart and abdomen, treat leg pain and arm pain, cure internal and external sores and ulcers, cure the accumulation of all viscera, cure meridians of stasis." And he pointed out that "olibanum, myrrh, the two drugs used to promote the internal organs, the circulation of the meridians of the important drugs, so where the heart, stomach, abdomen, limbs and joints all pain can be treated". "They are really good herbs because although they are opening medicines, they do not deplete the qi and blood". Frankincense is pungent, warm and aromatic, which can move blood stagnation, open the meridians and relieve pain; myrrh is hard and calm, good at dispersing blood stasis to reduce swelling and pain, the two drugs together, regulating qi and treating blood at the same time. Chinese angelica root and salvia miltiorrhiza can invigorate the blood and nourish it, resolve blood stasis and relieve pain, and smooth the meridians. They are combined with olibanum and myrrh to enhance the effect of the whole prescription in removing blood stasis and relieving pain. The compatibility of the four drugs complements each other, complements each other, so that stagnation can be dredged, blood stasis can be dispelled, qi and blood are treated together, playing the role of promoting blood circulation and dredging collaterals, removing blood stasis and generating new, eliminating swelling and pain. The compatibility of the prescription is clever, and the medication is simple. It also has the effect of promoting blood circulation and removing blood stasis without injuring the healthy energy, and dredging collaterals without injuring Yin.

5. Clinical application of HLXLD in orthopedics

HLXLD is widely used in orthopedics and traumatology of traditional Chinese medicine. It can be used to treat swelling and pain caused by qi and blood stasis caused by trauma or internal injury. The therapeutic effect is often obvious, which can effectively improve the swelling, pain and other discomfort symptoms of patients and improve the quality of life. For example, Fang et al used the basic prescription of HLXLD to treat a variety of orthopedic disorders, and the disease is immediately relieved [9]. At the same time, there are only four traditional Chinese medicines, which can be flexibly added or reduced according to clinical dialectics, and can also avoid the redundant flavor of prescription, thus reducing the burden of patients. The following author will review the application of HLXLD in the treatment of common diseases in orthopedics of traditional Chinese medicine in recent years, in order to provide reference for clinical application of orthopedics of traditional Chinese medicine.

5.1. Treatment of low back pain

Low back pain is often caused by falls and sprains, strong weight bearing, improper lumbar exertion or strain over time, resulting in damage to the lumbar tendons and bones, stagnation of qi and blood in the lumbar meridians, and pain if it does not pass. As mentioned in the "Suwen - stabbing lumbago": "Hengluo of the meridians, so that the lumbar pain, can not be propped up, up is the fear of puff, got the lifting of heavy injury waist, Hengluo extinction, the bad blood returned." The understanding of low back pain caused by qi stagnation and blood stasis has a long history. In clinical practice, lumbar disc herniation, acute lumbar sprain, rheumatic low back pain, lumbar degenerative diseases and so on can all cause low back pain symptoms. Among them, the patients with low back pain syndrome of qi stagnation and blood stasis syndrome have achieved remarkable curative effect in the treatment of HLXLD by activating blood circulation to remove blood stasis and dredging collaterals to relieve pain.

5.1.1. Treatment of Lumbar disc herniation

Lumbar disc herniation is often manifested as low back pain with lower limb radiation pain in clinical practice. This disease occurs in young adults and is the most common cause of low back and leg pain, which belongs to the category of 'low back pain' in traditional Chinese medicine. Li et al with HLXLD flavored combined with conventional lumbar massage to treat 87 patients with lumbar disc herniation achieved satisfactory results [10]. Qian's study confirmed that HLXLD was superior to dexamethasone and mannitol in the treatment of lumbar disc herniation.[11]. Sun et al. found that postoperative application of HLXLD for lumbar disc herniation was more effective than percutaneous laminectomy alone [12]. This shows that on the basis of simple massage, western medicine, surgery and other treatment methods, combined with the HLXLD, there is a significant gain in the treatment of lumbar disc herniation.

5.1.2. Treatment of Acute lumbar sprain

Lumbar sprain refers to the acute injury of lumbar muscles, fascia, lumbosacral joints and intervertebral joints, commonly known as flashing waist fork qi, which is commonly seen in young adults or manual workers [13]. Most of them are caused by improper waist strength during activity or labor, sprained servants and strong weight-bearing, resulting in impaired lumbar muscle expansion function. The injured place is due to trauma reaction resulting in qi and blood stasis, meridian obstruction, and local severe pain. Traditional Chinese medicine should promote blood circulation and dissipate blood stasis, and promote qi to relieve pain. Weng used the prescription HLXLD in the treatment of 36 patients with acute lumbar sprain and achieved definite curative effect [14]. It shows that HLXLD can relieve pain in patients with acute lumbar sprain. In addition, Wang has also achieved excellent curative effect in the treatment of acute lumbar sprain by manual massage combined with oral administration and external application of HLXLD [15]. By comparing with conventional western medicine such as chlorzoxazone and vitamin B6 in the treatment of acute lumbar sprain, Zhou found that HLXLD had better effect and less side effects [16]. This shows that the clinical application of HLXLD in the treatment of acute lumbar sprain can effectively reduce the pain symptoms of patients.

5.1.3. Treatment of Rheumatic low back

Rheumatic low back pain is an intractable chronic low back pain associated with fatigue, cold and long-term living wetlands. Traditional Chinese medicine believes that wind, cold and dampness evil invades the waist, resulting in poor circulation of qi and blood in meridians, qi stagnation and blood stasis, and liver and kidney involvement over time, thus inducing the disease. The waist has symptoms of acid, swelling, pain, numbness and weight. In the treatment of traditional Chinese medicine, the method of dispelling wind and removing dampness and nourishing liver and kidney is used. Duhuo Jisheng

decoction (angelicae pubescentis and loranthi decoction) is used to treat the disease. However, cold coagulation and dampness will lead to blood stasis. Combined with HLXLD to promote blood circulation and remove blood stasis and relieve pain, the curative effect is often better. For example, Yu used Duhuo Jisheng Decoction and HLXLD together in the treatment of patients with rheumatic low back pain, and the curative effect was good[17]. In order to further explore the curative effect of HLXLD combined with Duhuo Jisheng decoction, Li and Yan has done the clinical research experiment, when they treat acute lumbar sprain, they compared the curative effect of single use of Duhuo Jisheng decoction and combined use of HLXLD, found that the curative effect of combined use of HLXLD is better than single use of Duhuo Jisheng decoction [18-19]. Subsequently, Zeng's experiment further confirmed the above research viewpoints [20]. It can be seen that in the treatment of rheumatic low back pain, based on the application of Duhuo Jisheng Decoction for dispelling wind-dampness and tonifying liver and kidney, considering that cold coagulation and dampness suppression will lead to blood stasis, combined with HLXLD for activating blood circulation and removing blood stasis to relieve pain, the curative effect is often more obvious, which is worthy of clinical application.

5.2. Treatment of knee osteoarthritis

Knee osteoarthritis is a degenerative disease characterized by degeneration, destruction and bone hyperplasia of articular cartilage, which is common in middle-aged and elderly people [21]. Its main clinical manifestations are knee pain, accompanied by joint swelling, stiffness, bone friction (feeling), limited joint activity and other discomfort symptoms, which can seriously affect the lower limb force line, such as knee valgus or knee varus deformity. The disease belongs to the category of 'bone rheumatism' in traditional Chinese medicine [22]. Its main pathogenesis is liver and kidney deficiency, wind cold dampness evil invasion joints, resulting in blood stasis stagnation, meridians are not unobstructed, tendons and bones lost its nourishment, so pain and swelling and other discomfort. As stated in the *Lei Zheng Zhi Cai* (Classification and Dialectical Therapy): "All rheumatic diseases are caused by wind, cold, wet three pathogenic factors mixed together. First of all, Ying qi and Wei qi became weak due to injury, and the Couli became not full enough. And then the wind, cold and dampness entered the body. The right qi is blocked by the evil, can not run, and thus stagnation, blood coagulation, long time formed rheumatism". Modern studies have found that the occurrence and development of knee osteoarthritis are correlated with bone microcirculation disturbance, increased intraosseous pressure and abnormal blood rheology, which is very consistent with the concept of stagnation of blood stasis and obstruction of meridians in traditional Chinese medicine, and provides a diagnosis and treatment idea and basis for the treatment of knee osteoarthritis by promoting blood circulation, removing blood stasis and relieving pain[23]. Zhang Xichun said that *Achyranthes bidentata* could be added to HLXLD in the treatment of leg pain. Wang in clinical selection of 30 cases of knee osteoarthritis patients to oral HLXLD polypharmacy for treatment of disease, achieved 96.67 % of the total effective rate, visible its curative effect [24]. Teng found that the use of HLXLD after knee arthroscopy, patients have better recovery. And HLXLD can significantly improve the pain, stiffness and knee joint function of patients [25]. At the same time, Li's study found that the efficacy of Guizhi Shaoyao Zhimu Decoction combined with HLXLD in the treatment of knee osteoarthritis with Yang deficiency cold coagulation syndrome was better than glucosamine hydrochloride combined with Shujin Huoxue capsule[26]. Jia and others in follow the country famous old Chinese medicine professor Hu Yongsheng learning process also found that HLXLD can effectively improve the clinical symptoms such as swelling, pain, stiffness and activity disorders in patients with knee osteoarthritis, which has certain application value for the treatment of knee osteoarthritis [27].

5.3. Treatment of fractures and postoperative complications

Fracture is one of the most common diseases in the department of orthopedics and traumatology, which refers to the destruction of the integrity or continuity of the bone. The treatment methods are mainly surgery or manual reduction and fixation, but postoperative fractures are often accompanied by limb swelling, deep vein thrombosis and other complications. Traditional Chinese medicine orthopedics doctors in the past dynasties in the continuous practice summed up the 'Removal of stasis, generation of new blood, fracture healing' and 'If the blood does not circulate, the stasis cannot be eliminated, and if the stasis is not eliminated, the fracture cannot be continuous' and other more complete theory to guide the clinical treatment of fracture. HLXLD, as a famous prescription for promoting blood circulation and removing blood stasis and dredging collaterals to relieve pain, has the effect of promoting blood circulation and removing blood stasis without injuring the right qi, and dredging collaterals without injuring Yin. Through clinical syndrome differentiation, it also has obvious advantages in the treatment

of fracture and postoperative complications. When using HLXLD in the treatment of clavicle fracture, Wang and others found that HLXLD could not only accelerate the healing time of clavicle fracture, but also improve the healing quality, and the improvement of shoulder joint function was more obvious[28]. Traditional Chinese medicine in the treatment of fracture and complications in addition to oral drugs, there are external drugs and other treatment methods. For example, Wei and others found that the use of HLXLD compound fumigation for patients with rib fractures better improved local swelling, thoracic mobility, and was more conducive to functional recovery[29]. It has been shown that oral administration of the Chinese herbal medicine HLXLD compound after artificial knee and hip arthroplasty has a preventive and reducing effect on the occurrence of deep vein thrombosis in the lower extremities[30-31]. In conclusion, HLXLD can promote fracture healing, effectively improve patients' pain, swelling and other discomfort symptoms, and has a certain effect on the prevention and treatment of postoperative complications, which is worth promoting in the clinical application.

6. Conclusion

Through studying the related literature of HLXLD, it is found that HLXLD has a broad application prospect in orthopedic diseases. The prescription is ingenious in compatibility and simple in medication. It can be used flexibly according to syndrome differentiation. HLXLD has obvious clinical effects on lumbar disc herniation, lumbar sprain, rheumatic low back pain, fracture and postoperative complications, knee osteoarthritis and other orthopedic diseases. The main symptoms of these diseases are pain, and blood stasis is the pathogenic factor or pathological product. Qi and blood stasis are stagnation, meridians are blocked, and pain is caused by obstruction. TCM treatment should be based on promoting blood circulation and dredging collaterals, removing blood stasis and relieving pain. In addition, from the literature reports in recent years, it is found that some clinical studies have not set up a control group or the control group is not properly set up, and the rigor of clinical trials is lacking. Some clinical research samples are less, and evidence-based evidence of large samples is insufficient. The depth of clinical and laboratory studies on HLXLD is still lacking. These deficiencies will have a certain impact on the scientific results of the study, to be further improved, improved and in-depth research.

References

- [1] Anonymity. *Huangdi Neijing*. Beijing: China Medical Science Press, 2016.
- [2] Ma Min. *Study on microscopic mechanism of blood stasis syndrome*. 2003. Shandong University of Chinese Medicine, PhD dissertation.
- [3] Chen Rongxin. *Literature research on Zhongjing's treatment of blood stasis syndrome*. 2011. Beijing University of Chinese Medicine, MA thesis.
- [4] Chen Zhixia. "On the characteristics of Wang Qingren's blood stasis theory and the modern clinical application of promoting blood circulation to remove blood stasis." *Forum on Traditional Chinese Medicine*. 02(2005): 47-49.
- [5] Zhang Qi. *Lecture of Synopsis of Prescriptions of the Golden Chamber*. Beijing: People's Medical Publishing House(PMPH), 2016.
- [6] Wang Heming, and Huang Guicheng. *Orthopedics and Traumatology of Traditional Chinese Medicine*. Beijing: China Press of Traditional Chinese Medicine, 2012.
- [7] Ji Shunxin. *Theoretical research on diagnosis and treatment of bone injury in traditional Chinese medicine based on ancient literature*. 2016. Liaoning University of Chinese Medicine, PhD dissertation.
- [8] Qing Zhang Xichun. *Yi Xue Zhong Zhong Can Xi Lu*. Taiyuan: Shanxi Science and Technology Publishing House, 2009.
- [9] Fang Yihui, Zhang Guangshun, and Fang Dong. "New clinical application of Huoluoxiao Lindan in the department of traumatology." *Journal of Emergency in Traditional Chinese Medicine*. 18.10 (2009): 1715-1717.
- [10] Li Fenru, Fu Xiaoyun, and Li Aihong. "Clinical observation of 87 cases of lumbar disc herniation." *Practical Clinical Journal of Integrated Traditional Chinese and Western Medicine*. 12.05(2012):58-59.
- [11] Qian Tianyu. "88 cases of lumbar disc herniation with blood stasis treated by HLXLD." *Zhejiang Journal of Traditional Chinese Medicine*. 51.06 (2016): 441. Doi: 10.13633/j.carol carroll nki ZJTCM. 2016.06.036.
- [12] Sun DeShun, et al. "Clinical observation of percutaneous foraminoscopy combined with HLXLD in the treatment of lumbar disc herniation." *Chinese Journal of Traditional Medical Traumatology & Orthopedics*. 22.10(2014):33-35.
- [13] Zhan Hongsheng, and He Wei. *Orthopedics and Traumatology of Traditional Chinese Medicine*.

Beijing: China Press of Traditional Chinese Medicine, 2012.

[14] Weng Fengquan. "Jiawei Huoluo Xiao Lingdan treatment of 36 cases of acute lumbar sprain." *Guangxi Journal of Traditional Chinese Medicine*. 05(1988):13.

[15] Wang Renqun. "Massage techniques combined with Traditional Chinese medicine in the treatment of acute lumbar sprain." *Journal of Sichuan of Traditional Chinese Medicine*. 02(2008):114-115.

[16] Zhou Jinxian. "Clinical observation on 50 cases of acute lumbar sprain treated with Huoluo Xiao Lingdan." *Journal of Emergency in Traditional Chinese Medicine*. 21.02(2012):288.

[17] Yu Yuejun. "Duhuo Jisheng decoction combined with Huoluo Xiao Lingdan in the treatment of 26 cases of rheumatic lumbago." *Journal of Zhejiang Chinese Medical University*. 34.04(2010):506. doi:10.16466/j.issn1005-5509.2010.04.006.

[18] Li Heng. "Clinical analysis of Duhuo Jisheng Decoction combined with Huoluo Xiao Lingdan in the treatment of rheumatic lumbago." *Modern Chinese Doctor*. 50.28(2012):82-83.

[19] Yan Chongling. "Clinical analysis of Duhuo Jisheng Decoction combined with Huoluo Xiao Lingdan in the treatment of rheumatic lumbago." *Asia-Pacific Traditional Medicine*. 11.17(2015):129-130.

[20] Zeng Qingming. "Clinical analysis of Duhuo Jisheng Decoction combined with Huoluo Xiao Lingdan in the treatment of rheumatic lumbago." *Journal of clinical rational drug use*. 8.33(2015):121-122. doi:10.15887/j.cnki.13-1389/R.2015.33.066.

[21] Kenneth D. Brandt, et al. "Etiopathogenesis of Osteoarthritis." *Medical Clinics of North America*. 93.1(2008). doi:10.1016/j.mcna.2008.08.009.

[22] Chen W H. "Guidelines for TCM Diagnosis and Treatment of knee osteoarthritis (2020 edition)." *The Journal of Traditional Chinese Orthopedics and Traumatology*. 32.10(2020):1-14.

[23] Yang L, et al. "Hemorheological changes in knee osteoarthritis: multivariate anova and cross-sectional observation." *Chinese Journal of Tissue Engineering Research*. 13.11(2009):2053-2056.

[24] Wang C A. "Jiawei Huoluo Xiao Lingdan in the treatment of 30 cases of knee osteoarthritis." *Yunnan Journal of Traditional Chinese Medicine and Materia Medica*. 32.08(2011):48. doi: 10.16254/j.cnki.53-1120/R.2011.08.025.

[25] Teng Juzan, Su Bo, and Wang Dawei. "Arthroscopic debridement combined with HLXLD for knee osteoarthritis of qi stagnation and blood stasis type." *Journal of Liaoning University of Traditional Chinese Medicine*. 15.01 (2013): 167-169. The doi: 10.13194 / j.j lunivtcm. 2013.01.169. Tengjz. 083.

[26] Li Z H. Clinical study of Warming Yang and Promoting Blood Circulation in the treatment of knee osteoarthritis (Yang Deficiency and Cold coagulation syndrome). 2014. Guangzhou University of Chinese Medicine, MA Thesis.

[27] Jia Qiuying, Zhang Haibo, and Zhao Dexi. "Case study of Professor Hu Yongsheng's application of Huoluo Xiao Lingdan in the treatment of osteoarthritis." *Rheumatism and Arthritis*. 3.03(2014):43-45.

[28] Wang Renqun, et al. "Clinical efficacy of HLXLD in the treatment of unstable clavicle fracture." *Shaanxi Journal of Traditional Chinese Medicine*. 36.12(2015):1621-1623.

[29] Wei Donghua, et al. "Effect of Fumigating and washing with Jiawei HLXLD in the treatment of simple rib fracture." *Journal of Emergency in Traditional Chinese Medicine*. 29.08(2020):1470-1472.

[30] Teng Juzan, et al. "Clinical observation on prevention of deep vein thrombosis after knee arthroplasty with Jiawei Huoluo Xiao Lingdan." *China Practical Medicine*. 9.16(2014):147-148. doi: 10.14163/j.cnki.11-5547/R.2014.16.103.

[31] Teng Juzan, et al. "Huoluo Xiao Lingdan supplementation prevents 50 cases of deep vein thrombosis after hip arthroplasty". *Henan Traditional Chinese Medicine*. 35.08(2015): 1855-1856. Doi: 10.16367/j.issn.1003-5028.2015.08.0780.