

Clinical research progress of acupuncture therapy in the treatment of ankylosing spondylitis

Yue-Yu Zhang¹, Ai-Qun Song^{2*}

¹College of Acupuncture and Orthopedics, Hubei University of Traditional Chinese Medicine, Wuhan 430000, China. ²Department of Acupuncture, Hubei Provincial Hospital of Traditional Chinese Medicine, Wuhan 430000, China.

*Corresponding to: Ai-Qun Song, Department of Acupuncture, Hubei Provincial Hospital of Traditional Chinese Medicine, Wuhan 430000, China. E-mail: songaiqun@hbhtcm.com.

Competing interests

The authors declare no conflicts of interest.

Acknowledgments

This work was supported by National Administration of Traditional Chinese Medicine: 2019 Project of building evidence-based practice capacity for TCM. (No.2019XZZX-ZJ006)

Citation

Zhang YY, Song AQ. Clinical research progress of acupuncture therapy in the treatment of ankylosing spondylitis. *Med Theor Hypothesis*. 2022;5(2):10. doi: 10.53388/TMRTH202206010.

Executive editor: Yue-Tong Wang, Chun-Jie Sun.

Received: 22 March 2022; **Accepted:** 21 April 2022;

Available online: 01 June 2022 .

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Abstract

Ankylosing spondylitis is a chronic inflammatory disease characterized by ankylosis of the spine and sacroiliac joints. The continuous development of this disease can cause damage to multiple organs. At present, modern medical treatment programs generally focus on symptomatic treatment such as analgesia and anti-inflammatory, which can relieve pain and inflammation to a certain extent, but there are many problems such as adverse drug reactions, and cannot be completely cured. Modern medical treatment of ankylosing spondylitis focuses on relieving symptoms, controlling disease activity, slowing disease progression, and reducing disability rates. As an important part of traditional Chinese medicine, acupuncture therapy, compared with modern medicine, has obvious advantages in the treatment of ankylosing spondylitis, such as good curative effect, quick effect, safety and low price, and no toxic and side effects. By reviewing the literature, it is found that there are a large number of clinical studies on the treatment of ankylosing spondylitis by acupuncture and moxibustion in recent years, and it is concluded that acupuncture and moxibustion has unique advantages in reducing local pain, alleviating inflammatory symptoms, improving joint function, preventing spinal deformity, and improving quality of life. Therefore, this study summarizes and reviews the relevant literature on different acupuncture and moxibustion therapy for ankylosing spondylitis, in order to provide ideas and solutions for the effective treatment of this disease.

Keywords: ankylosing spondylitis; acupuncture therapy; acupuncture analgesia; acupuncture points

Background

Ankylosing spondylitis (AS) is a chronic autoimmune disease with the spine as the main lesion site and often involving the sacroiliac and peripheral joints [1]. In the early stage of the disease, patients may have pain and stiffness in the lower back, and in the later stage, it can gradually induce axial joint deformity and spinal fibrosis, and even lead to different degrees of heart, lung, eye, ear and nervous system lesions [2]. Severe AS will leave a lifetime of deformity and disability, with insidious onset, protracted disease course, and many complications [3]. The prevalence of AS in China is about 0.3%, mainly in young and middle-aged men aged 20–40 [4]. The etiology and pathogenesis of AS have not been fully elucidated. The current research results mainly believe that the pathogenesis of AS is mainly related to factors such as heredity, infection, and immune environment [5]. In particular, genetic factors play an important role in the pathogenesis of AS. The misfolding of human leukocyte antigen B-27 (HLA-B27) plays a key role in regulating the inflammatory response of AS. The abnormal expression of HLA-B27 disrupts the balance of autoimmunity and activates the immune response [6], thereby triggering an immune response leading to the inflammation of AS. Sacroiliitis is a typical pathogenic feature of AS, which mainly occurs in adolescents, often causing disability and deformity in adolescents, which will seriously affect the quality of life of patients in the future [7]. Therefore, timely treatment in the early stage of AS is particularly important. The clinical medication of AS is mainly based on non-steroidal anti-inflammatory drugs and glucocorticoids. Although the efficacy is acceptable, if long-term dependence on drug treatment, there are adverse reactions such as heavy economic burden and impaired liver and kidney function [8]. Surgery is mainly based on joint replacement, but there are problems such as excessive trauma and poor prognosis in open surgery [9]. Some studies have shown that acupuncture therapy, as an important part of external therapy of traditional Chinese medicine (TCM), has achieved significant clinical results in the treatment of AS, because of its economical safety, simplicity, obvious curative effect, and few adverse reactions [10, 11]. The methods of acupuncture and moxibustion therapy for AS are becoming more and more diversified. Therefore, this paper organizes and analyzes the clinical research of acupuncture and moxibustion therapy for AS in recent years. The research overview of acupuncture therapy for AS is as follows:

The etiology and pathogenesis of AS in TCM

In ancient traditional medicine, there is no clear TCM name of AS, and it is usually classified into the category of "Arthralgia Syndrome" (It refers to a class of diseases caused by the invasion of external pathogens such as Wind, Cold, Dampness and Heat, blocking the meridian joints, affecting the circulation of Qi and blood, and causing migratory redness, swelling and pain in the joints of the whole body.) according to the symptoms of onset of limb pain and numbness [12]. From the perspective of TCM, the etiology of AS is the result of the combined action of internal and external factors in the human body, including the deficiency of vital "Qi" (The concept of Qi is the core of the construction of TCM theory. The interpretation of Qi in modern TCM theoretical research is influenced by scientific empirical thinking, and it is accustomed to describe Qi as a substantial existence or a materialized element matrix with quantitative and visual empirical expressions.) in the human body, dystrophy of the bones and veins, and exogenous pathogenic factors such as "Wind" (One of the six prostitutes. Wind is Yang evil, its nature is open and venting, and good deeds change in number. Therefore, the disease is more likely to invade the upper part of the human body and the muscle surface, the disease changes rapidly, and the disease position is unstable.), "Cold" (Cold evil refers to a type of Cold evil that can cause fever symptoms.), "Dampness" (one of the six prostitutes. Dampness is a Yin evil, its nature is heavy, turbid and sticky, and it is easy to block the Qi.), "Heat" (one of the causes. The pathogenic characteristic is the occurrence of fever and positive evidence, which is often referred to or mixed with fire evil. Common clinical symptoms include fever, redness, swelling, soreness, and constipation.), "Phlegm" (Refers to pathogenic factors, pathological products, and sometimes disease syndromes.), and "Blood Stasis" (Blood Stasis refers to the blockage of blood flow, while Blood Stasis is a pathological product formed by poor blood flow to a certain extent, which is

a visible evil.). The invasion of pathogenic "Qi" leads to stagnation of "Qi" and blood, stagnation of "Phlegm" and drinking, dystrophy of muscles and veins, and deficiency of Kidney-essence and "Governor Vessel" (The Governor Meridian is one of the Eight Extraordinary Meridians. Superintendent, has the meaning of general manager and commander.), resulting in pain and swelling of joints, spine, and even bending deformities in patients with AS. TCM believes that the disease site of AS lies in the bones. "Huangdi Neijing Suwen" (Yellow Emperor's Inner Classic: Plain Questions; 221 B.C.E.–220 C.E.) points out that "Kidney Meridian Nourishes Marrow" (This is a traditional Chinese medicine concept.), and the bone marrow is stored in the bone cavity to nourish the bones. Therefore, the lesions of AS in the neck, low back, sacroiliac and other parts are closely related to the lesions of the kidney meridian [13]. TCM believes that the pathogenesis of AS belongs to the deficiency of the root ("Ben" ("Biao" and "Ben" are the therapeutic theories used to analyze the contradictions of various diseases and syndromes, distinguish the primary and secondary, and solve the main contradiction when treating diseases in traditional Chinese medicine. The "Biao" is the phenomenon, and the "Ben" is the essence. "Standard" and "Ben" are two opposite aspects of each other.)) and the repletion of branch ("Biao" (It is the phenomenon.)). Taking the invasion of "Wind", Cold" and "Dampness" as the "Biao", and taking the deficiency of the kidney and governor as the "Ben". The internal and external factors are combined, so that the "Qi" of the "Governor Vessel" is not running smoothly, and if it is blocked, it will cause pain. Therefore, invigorating the kidney meridian and dredging the governor meridian, expelling "Wind" and removing "Dampness", and warming the "Yang" (Yin and Yang are a pair of categories in ancient Chinese philosophy. The original meaning refers to the back of the sun, the sun is Yang, the back of the sun is Yin. From this extension, it is the cold and warm climate, the up and down, around, inside and outside of the azimuth, and the restlessness and tranquility of the movement state. It is used to represent the positive and negative aspects of opposites and mutual fluctuations of things, and then expounds the rules of occurrence, development and change of things.) and dredging collaterals are the keys to the treatment of AS patients by TCM.

Clinical application of acupuncture therapy for AS

Acupuncture therapy for AS can relieve pain symptoms, delay muscle atrophy, and improve joint function. In clinical practice of acupuncture and moxibustion for AS patients, the treatment methods are increasingly diversified, and specific treatment plans are often formulated according to the differences between the symptoms and signs of the spinal joints, so as to achieve the purpose of reducing clinical symptoms and delaying the development of the disease. At present, the representative acupuncture treatments commonly used in the treatment of AS include fire needling, acupotomy, warm acupuncture, "Governor Vessel" moxibustion and pricking blood and cupping. The following clinical studies of different acupuncture and moxibustion therapy for AS are summarized and analyzed.

Fire needle therapy

Fire needle, also known as "burning needle" and "quenching needle", refers to the method of using fire to burn the needle red and then quickly piercing the needle tip into acupoints or lesions to treat diseases. It has the functions of warming the meridians, dispelling "Cold" and removing "Blood Stasis", promoting blood circulation and relieving pain. Fire needle therapy has a good effect on relieving pain and stiffness symptoms in the early stage of AS, and can effectively control the continuous development of AS, and can also prevent joint deformities in the late stage of AS. Zhao Fang et al. used fire needle to treat 86 cases of AS patients with kidney deficiency, "Cold" and "Dampness" type [14]. The treatment group was treated with fire needling plus oral celecoxib capsules, while the control group was treated with oral celecoxib capsules alone. The results showed that the disease function index and activity index of Bath AS in the treatment group were lower than those in the control group, and the effective rate was significantly higher than that in the control group (the effective rate was 90.69% in the treatment group and 74.41% in the control group). Fire needle therapy has been proved to be effective in AS patients with kidney deficiency, "Cold" and "Dampness" type, and has no toxic and side effects. It has the effect of invigorating the kidney and strengthening the governor, strengthening body resistance to

eliminate pathogenic factors. He Lei performed fire needle on the governor meridian, bladder meridian and Jiayi point of 48 AS patients, and found that fire needle treatment of AS can significantly improve the overall pain and morning stiffness symptoms of AS patients [15]. At the same time, laboratory indexes such as erythrocyte sedimentation rate and C-reactive protein in AS patients were improved to varying degrees compared with those before treatment. Fire needle therapy uses the acupuncture effect of filigree needles and the thermal effect of fire to stimulate acupoints and stimulate meridian "Qi", which can dispel "Cold", remove "Dampness" and relieve pain. It is suitable for the treatment of AS patients with "Cold-Dampness" obstruction syndrome. Fire needle therapy is a type of acupuncture therapy. Compared with drug therapy, it has no toxic and side effects, does not increase the burden of gastrointestinal metabolism in AS patients, and has the advantages of definite curative effect, less trauma, simple operation, and easy acceptance by patients. It is suitable for clinical promotion [16].

Acupotomy therapy

Under the guidance of the theory of meridians and tendons, acupotomy treatment for AS is based on the syndrome differentiation of the meridians to determine the lesions of the tendon knots. The acupotomy is used to release the adhesion and compression of the damaged local soft tissue, which can restore the stress balance of the bowstring mechanical system to varying degrees. Thereby, it can improve joint pain and limb function [17]. During the inflammatory reaction of AS, symptoms such as tendon attachment point inflammatory reaction and joint synovial hyperplasia often occur. The use of acupotomy therapy to act on the human body has the effects of adjusting joint disorders, releasing muscle adhesions, and improving the body's dynamic balance [18]. Bian Junrong chose to perform needle-knife release on the interspinous ligament, articular facet joint, costovertebral joint and other parts [19]. The results of the study showed that the Schober test of spinal mobility in AS patients after release was greater than 3.5cm. The difference between the chest circumference at the end of deep inspiration and deep expiration was greater than 3.5cm, and acupotomy significantly improved the movement limitation of the thoracic and lumbar spine caused by AS. Jiang Zhigang selected the interspinous ligament, the intertransverse process muscle or the intertransverse process ligament as the needle-knife insertion point to release and strip 60 AS patients [20]. After 2-3 weeks, it was observed that most patients with AS had their pain in the lower back disappeared, the flexion of the spine was corrected, and the corresponding functional activities were restored. Zhu Jun et al. performed needle-knife flat needling on the interspinous ligament and paravertebral facet joints under X-ray positioning in the treatment of patients with AS in remission [21]. The spinal mobility limitation of the patients after needle-knife was relieved to varying degrees. Different acupotomy methods for the treatment of AS can improve inflammatory indexes, delay bone damage, improve joint mobility, and relieve joint pain to a certain extent. In addition, the needle-knife can be positioned by means of X-ray, CT and other visualization methods, which is helpful for accurate release of AS lesions. Acupotomy therapy combines the acupuncture of TCM with the scalpel of modern medicine, which can not only play the role of acupuncture to clear the meridians and collaterals, but also can loosen the joints by cutting the meridians and tendons with the knife. It has the characteristics of small incision, quick curative effect, economical and practical. It is suitable for AS patients with limited mobility due to adhesion contracture of the spine or joints [22].

Needle warming therapy

Warm needling therapy is a TCM treatment method that integrates acupuncture, moxibustion, drug stimulation and specific acupoint stimulation. In the process of needle retention, the moxa velvet is twisted and wrapped on the needle handle or the moxa column is fixed on the needle handle and ignited. The "Heat" generated by the burning of moxa velvet is transmitted to the deep layer of the lesion through acupuncture needles. Warming needle uses meridian stimulation and warming effect to speed up local blood circulation, promote the absorption and dissipation of inflammatory exudates, improve mobility, and relieve joint pain. Xu Shaofei et al. took warming needle for AS as the observation group and western medicine as the control group [23]. By comparing the AS index and clinical indicators between the two groups, it was found that warming needle in the treatment of AS was effective, with low adverse reactions and safety. It can

effectively speed up blood circulation, inhibit the exudation of inflammatory mediators to a certain extent, enhance the activity of white blood cells, and effectively improve the clinical symptoms of patients. Liu Xiao conducted a randomized controlled study on 62 AS patients [24]. The control group was given conventional oral non-steroidal anti-inflammatory drugs, and the observation group was treated with warming needle and massage. The results of the study showed that the treatment of AS patients with warming needle combined with massage has a significant effect, which is better than oral sulfasalazine and ercoxib treatment, and the recurrence rate is lower, and the quality of life of AS patients is significantly improved. Warming needle moxibustion for AS is based on conventional acupuncture treatment, with the help of moxibustion to generate warm stimulation on the "Meridians and Acupoints" (Based on the traditional concept of traditional Chinese medicine, it is an anatomical and physiological system with special functions that exists in our human body.), and then exert the effects of warming meridians and dredging collaterals, activating "Qi" and blood, dispelling "Dampness" and "Cold". At the same time, moxibustion can effectively control the inflammatory response of AS patients, reduce the inflammatory damage of the body, and also has a two-way immunoregulatory function, which can promote the improvement of various clinical symptoms and indicators of AS patients, and can maintain a good therapeutic effect for a long time. It has good long-term efficacy and can effectively reduce the recurrence of AS, especially for AS patients with kidney deficiency and "Governor Vessel" "Cold" syndrome [25].

"Governor Vessel" moxibustion therapy

"Governor Vessel" moxibustion (Du-moxibustion) is a characteristic acupuncture and moxibustion external treatment method based on the combination of TCM external treatment theory and traditional moxibustion. Through the dual effects of TCM powder and moxibustion, it can stimulate the "Yang Qi" (Opposite Yin Qi. Generally refers to one of the two opposite sides of a thing.) of the governor meridian and regulate the "Qi" and blood of the kidney essence. AS belongs to the "Governor Vessel disease". The onset and involved parts of AS are basically consistent with the governor meridian circulation path [26]. According to the theory of meridian circulation, the governor meridian can be treated for AS based on syndrome differentiation. Yang Jiguo et al. randomly divided 90 AS patients with "Kidney-Yang" (Terms of traditional Chinese medicine. Refers to the Yang Qi of the kidney.) deficiency syndrome into a Du-moxibustion group, an acupuncture group, and a Western medicine group. Symptoms, signs, laboratory indicators and the temperature difference of the thermal image of the spine were used as observation indicators [27]. The results of the study showed that the clinical efficacy of Du-moxibustion was better than that of the other two groups, which was mainly related to the comprehensive effect of Du-moxibustion on the functions of meridians, drug penetration, warm stimulation and foaming reaction. From the data of back thermal images before and after treatment, the effect of Du-moxibustion on temperature difference was better than that of the other two groups, indicating that Du-moxibustion can significantly improve the inflammatory response of AS patients with "Kidney-Yang" deficiency. The visualization of back thermal image can intuitively reflect the activity and intervention effect of Du-moxibustion in the treatment of AS. Liu Huaisheng et al. used Du-moxibustion combined with celecoxib capsules to treat 60 AS patients with "Kidney-Yang" deficiency syndrome [28]. After treatment, it was found that the patient's spinal activity, morning stiffness time, erythrocyte sedimentation rate, TCM syndrome score, and TCM syndrome curative effect were significantly improved, and there were no adverse reactions. It shows that Du-moxibustion combined with celecoxib in the treatment of AS can effectively relieve pain symptoms and improve joint mobility in patients with "Kidney-Yang" deficiency syndrome, with significant clinical efficacy and high safety. "Governor Vessel" moxibustion is also known as "Fire Dragon Moxibustion" (It is a kind of moxibustion method gradually evolved from traditional moxibustion.) and "long snake moxibustion". It has the characteristics of strong firepower, large area, fast onset and good curative effect. Moxibustion on the "Governor Vessel" belongs to the "big moxibustion" method, which is unmatched by general moxibustion therapy, and is especially suitable for the treatment of AS patients with "Kidney-Yang" deficiency syndrome [29]. The "Governor Vessel" is the general director of the "Yang" meridian of the whole body, and it controls the "Yang Qi" of the whole body. For AS patients with

deficiency of "Kidney-Yang" Moxibustion on the "Governor Vessel" can invigorate the "Kidney-Yang", warm the meridians and dredge the collaterals, dispel "Cold" and relieve pain. Modern research found that Du-moxibustion can regulate the immune function of the human body, promote the dissipation of inflammatory mediators, reduce the destruction of bone, inhibit the rapid development of the disease, slow down the occurrence of spinal deformities, and improve the quality of life of patients [30].

Pricking blood and cupping therapy

Pricking blood and cupping therapy combines two external treatment methods of TCM: blood pricking method and cupping method. Usually, cupping is added to the skin after superficial puncturing and bleeding of the lesions, and a small amount of blood is sucked out, which has the effect of promoting blood circulation and removing "Blood Stasis". Twelve skin areas (twelve functional activities are reflected in the part of the meter, and it is the vascular gas discharge) are closely related to the meridians and viscera. By pricking blood and cupping the skin areas, it can remove "Blood Stasis", stimulate meridian "Qi", regulate viscera, dredge meridians, and harmonize "Qi" and blood [31]. It has a good effect on the treatment of AS patients with stagnation of "Qi" and blood. Wang Wen et al. selected points of the "Governor Vessel", Back-Shu and Jiaji (EX-B2) to pierce blood and cupping to treat AS, and the clinical efficacy and treatment time were better than those of the control group with oral western medicine [32]. The therapeutic effect of pricking blood and cupping on AS is confirmed. The mechanism of its treatment of AS may be through pricking blood and cupping, which can accelerate the blood circulation of the whole body, eliminate the pathological products, and quickly restore the body's resistance. In addition, it also has the functions of reducing neuromuscular excitability, promoting local tissue nutrient metabolism, anti-inflammatory, reducing swelling and relieving pain, and regulating immunity. Pan Xiaojin et al. divided 40 AS patients into a pricking blood and cupping combined with acupuncture treatment group and a simple acupuncture control group [33]. The results of the study showed that the improvement of the joint mobility of AS patients in the treatment group was significantly better than that in the control group. After 3 courses of treatment, the effective rate and clinical indexes of the treatment group were higher than those of the control group, which indicated that pricking blood and cupping had better clinical effect in the treatment of AS. Through pricking blood and cupping, it can effectively stimulate the immune function of the human body, speed up the metabolism of the human body, help to dredge the meridians, and regulate the balance of "Yin" (Yin and Yang are a pair of categories in ancient Chinese philosophy. The original meaning refers to the back of the sun, the sun is Yang, the back of the sun is Yin. From this extension, it is the cold and warm climate, the up and down, around, inside and outside of the azimuth, and the restlessness and tranquility of the movement state. It is used to represent the positive and negative aspects of opposites and mutual fluctuations of things, and then expounds the rules of occurrence, development and change of things.) and "Yang" of the viscera of the human body. Because of its strong effect of promoting blood circulation and removing "Blood Stasis", it is suitable for the treatment of AS patients with "Qi" and "Blood Stasis" type.

Conclusion

AS is a chronic inflammatory disease with the spine as the main lesion site, often involving the sacroiliac and peripheral joints, which will seriously affect the quality of life of patients, and even lead to lifelong disability [9]. AS is an autoimmune disease. Abnormal activation and dysfunction of the immune system are the main reasons for the occurrence of AS [34]. Studies have shown that the immune cells in patients with AS will undergo significant changes, especially the changes in T cells [35]. The imbalance and dysfunction of CD4+ (cluster of differentiation 4) T cell subsets play an important role in the occurrence and development of AS [36]. As a new subset of CD4+ T cells, Th17 cells (helper T cells) can secrete immune factors such as IL (interleukin)-17 and IL-22, which can promote the activation of T cells and stimulate other cells to produce IL-6, IL-8, granulocyte-macrophage stimulation factors and other cytokines mediate the occurrence of inflammatory responses [37]. Immune system dysfunction in patients with AS, Th17 cells in the body are significantly increased, and Treg (regulatory T) cells are in a low level, resulting in an increase in the

Th17/Treg ratio. This makes IL-17, IL-22, IL-23, IL-6 and other inflammatory factors at high expression levels, and AS patient is in a state of inflammatory reaction for a long time [38]. Studies have shown that acupuncture and moxibustion play a role in regulating AS immunity by mediating Th17/Treg/Th1 regulation of cellular immune disorders and inflammatory responses caused by disorders. The mechanism of acupuncture therapy for AS may be related to that acupuncture and moxibustion increased the number and ratio of Treg and Th1 cells, and decreased the number and ratio of Th17 cells [39]. Other studies have shown that acupuncture can significantly reduce the levels of pro-inflammatory cytokines IL-6 and TNF- α (Tumor necrosis factor- α), accelerate local blood flow, and block the release of inflammatory factors, thereby effectively regulating the immunity of patients with AS [40]. At present, modern medicine cannot completely cure the disease. The treatment of AS in TCM is divided into two basic methods: internal treatment and external treatment. Internal treatment of TCM is mainly based on oral administration of TCM decoction, with flexible formulations, mainly based on TCMS that nourish the liver and kidney, soothe meridians and activate collaterals, dispel "Wind" and overcome "Dampness", and strengthen kidney and bones [41]. It can regulate Qi-Blood and viscera functions in patients with AS, which is beneficial to control inflammation, delay and improve bone destruction [42, 43]. However, TCM has a large amount and a bitter taste when taken orally, and the decoction needs to be temporarily decocted, which is more troublesome and is also a problem of internal treatment method [44]. External treatment of TCM mainly includes different acupuncture and moxibustion therapies, through acupuncture to dredge the meridians and moxibustion to warm the "Yang" and strengthen the bones, and the combined use can harmonize the meridians and invigorate the kidney-essence and strengthen the "Governor Vessel" [45]. Compared with TCM internal therapy, acupuncture therapy for AS has the advantages of quick effect, less side effects, low cost, green safety and so on [46]. It can effectively improve the mobility of the patient's spine and reduce the pain of the patient. Fire-needle therapy and warm-needle moxibustion therapy are suitable for AS patients with kidney deficiency and governor "Cold" syndrome due to their strong warming ability [14, 23]. "Governor Vessel" moxibustion therapy has a strong effect of warming "Yang" and tonifying the kidney, and is especially suitable for AS "Kidney-Yang" deficiency syndrome [29]. Acupotomy therapy is mainly used to release adhesions and is suitable for patients with limited mobility of the spinal joints in the late stage of AS [22]. Pricking blood and cupping therapy mainly has the effect of promoting blood circulation and removing "Blood Stasis", and it is suitable for patients with "Qi" and "Blood Stasis" syndrome caused by the prolonged course of AS [32]. Compared with pure acupuncture or moxibustion, different acupuncture and moxibustion therapies are often combined in the clinical treatment of AS [47]. Acupuncture therapy can also select the most suitable individualized treatment plan for AS patients after comprehensive evaluation according to the severity of the disease and the different syndrome types, which is beneficial to improve the patient's compliance and treatment effect.

At the same time, there are still the following problems in the treatment of AS with acupuncture: 1. There is no unified evaluation standard for the clinical efficacy of AS patients. Some studies used Bath AS disease function index and activity index to evaluate, and other studies were based on clinical indicators such as visual analogue scale, morning stiffness time, erythrocyte sedimentation rate, C-reactive protein, X-ray, joint tenderness index, thoracic range of motion, and spinal range of motion were used to evaluate AS [14, 23]; 2. In the treatment of AS, the technical level of acupuncture and moxibustion of the physician directly affects the treatment effect. It is necessary to formulate strict operating technical specifications to ensure the clinical effect. In addition, acupuncture treatment focuses more on reducing pain symptoms and improving joint function in patients with AS, but not enough attention to psychological problems, resulting in anxiety, depression and other psychological problems in patients with AS [48]; 3. The TCM syndrome types of AS are different, and the selected acupuncture treatment methods should also have their own emphasis. Different acupuncture treatments should be used according to each syndrome type, and combined therapy can be adopted if necessary [49]; 4. The mechanism of acupuncture therapy for AS is complex and has not been fully elucidated. Most studies are limited to clinical efficacy observation and experience summary, while large-sample, multi-center, high-quality randomized controlled trials and

basic research on the mechanism of AS-related mechanisms are relatively rare [50]; 5. The current clinical research on acupuncture therapy for AS has problems such as small observation sample size, short observation period, unclear long-term efficacy, low reliability of clinical evaluation, and lack of repeatability and reference [51]. Therefore, in order to better relieve the pain symptoms of AS patients, improve joint function, and improve the quality of life, we should maximize the combined synergistic effect of acupuncture and moxibustion therapy. In the future, we should formulate a unified assessment standard for the efficacy of AS, strengthen basic experimental research on AS, pay attention to long-term efficacy observation, and improve the mechanism of acupuncture in the treatment of AS, in order to provide more complete evidence-based medical support for the treatment of AS with acupuncture therapy.

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