

Clinical Research Progress of Traditional Chinese Medicine in Treating Metabolic Syndrome

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Keywords: Metabolic syndrome, Traditional Chinese medicine, Clinical research, Research progress

Abstract: Metabolic syndrome (MS) is a pathological state of a group of metabolically interrelated risk factors, including obesity, hyperglycemia, dyslipidemia and hypertension, which is closely related to the occurrence of cardiovascular disease and type 2 diabetes. Most researchers believe that insulin resistance (IR) plays a central role in the pathogenesis of MS, and abdominal obesity is an important initiating factor of MS. According to the incidence and clinical characteristics, most scholars attribute MS to the category of 'obesity', 'pidan', 'abdominal fullness' and other diseases, saying that its occurrence is related to congenital deficiency, acquired malnutrition, emotional disorders and other factors. The location of the disease is mostly related to the liver, spleen and kidney. The disease is mainly based on the deficiency of the spleen and kidney, and the pathological products such as phlegm, turbidity, blood stasis and toxin are the standard. Based on the overall concept and the concept of syndrome differentiation and treatment, Traditional Chinese medicine can effectively improve clinical symptoms, delay disease progression and have good safety, showing the broad prospects of Traditional Chinese medicine in this research field. This article reviews the clinical research on the etiology and pathogenesis, syndrome differentiation and treatment, special prescription treatment and acupuncture treatment of MS in recent years, in order to provide reference for later clinical and basic research.

1. Introduction

Metabolic syndrome (MS) is a pathological state of a group of metabolically interrelated risk factors, including obesity, hyperglycemia, dyslipidemia and hypertension, which is closely related to the occurrence of cardiovascular disease and type 2 diabetes [1]. With the rapid development of economy, the deepening of urbanization, refined and excessive diet, lack of exercise and sedentary working environment, the prevalence of MS is increasing. Therefore, it is of great clinical significance to explore an effective treatment method. The mechanism of MS is complex, which is currently considered to be related to insulin resistance, central obesity, chronic low-grade inflammation, abnormal renin-angiotensin system, intestinal flora imbalance and other factors [2]. In recent years, there are more and more researches on MS by Traditional Chinese medicine, which has shown that Traditional Chinese medicine has unique advantages and broad development prospects in the

treatment of MS. The relevant clinical research in the past five years is summarized as follows:

2. Etiology and pathogenesis

Although there is no record of MS in ancient books, its clinical symptoms can be attributed to diseases such as 'obesity', 'spleen dan' and 'diabetes' in Traditional Chinese medicine. Liu Chunhua [3] believes that improper diet, lack of exercise, and excessive stress are the main causes of MS. The key to the disease is spleen deficiency, and the core is liver depression and qi stagnation. The spleen governs transportation and transformation, the spleen deficiency loses transportation, the water and grain are subtle, and the turbidity is not separated, resulting in phlegm dampness and stasis accumulation; the liver governs the dispersion, and the liver dysfunction affects the distribution of qi, blood and body fluid, aggravating the metabolic disorder of the body. Liu Li [4] believes that the incidence of MS is closely related to congenital deficiency and acquired dystrophy (eating disorders, emotional disorders, excessive ease, aging and body failure), and summarizes that spleen and kidney deficiency is the fundamental pathogenesis of MS. It is emphasized that phlegm dampness is not only the pathological basis of MS, but also the key to transforming phlegm heat and phlegm stasis. Lu Bo summarizes that the core pathogenesis of MS is stomach heat and spleen stagnation, phlegm turbidity and blood stasis [5]. He believes that improper diet is the primary cause of MS, and the pathogenesis is improper diet → gastrointestinal dysfunction → food stagnation and heat → heat consumption Taiyin → dampness turbidity and spleen stagnation → spleen disease and liver → liver and spleen imbalance → middle Jiao imbalance → phlegm heat and blood stasis → ascending and descending dysfunction. Su Runze [6] believed that the occurrence and development of MS is closely related to the formation of turbidity, phlegm, blood stasis and toxin. At the beginning of the disease, phlegm turbidity was caused by eating fat and sweet taste, sitting and less movement. Later, phlegm turbidity affected the normal operation of qi and blood, resulting in phlegm and blood stasis, and finally formed a state of phlegm, turbidity and blood stasis accumulation, which filled the whole body and poisoned the shape. Ma Haoliang [7] believes that MS is caused by the irregular life of modern people, overwork, sedentary, irregular diet, emotional disorders and other injuries to the spleen and stomach. The damage of spleen and stomach will lead to the imbalance of qi, blood, yin and yang, which will be manifested as phlegm dampness, blood stasis, qi deficiency, qi stagnation, cold and heat, yin and yang imbalance, and ultimately lead to the occurrence of MS due to the dysfunction of zang-fu organs. Jin Hongyuan [8] believes that the formation of MS is related to endowment, diet, fatigue and emotion, and the key to the pathogenesis is liver depression and spleen trapped. Liver and spleen are the key to the regulation of qi movement, and also play an important role in water and grain transportation and metabolism. Disorder of liver and spleen, imbalance of middle energizer, unfavorable transportation and transformation of qi, blood and body fluid, retention of harmful substances such as dampness, turbidity, stasis, toxin and ointment in the body, accumulation into excess and then cause MS.

In summary, the occurrence of MS is related to congenital deficiency, acquired dystrophy, emotional disorders and other factors. The location of the disease mostly involves the liver, spleen and kidney. The nature of the disease is mainly based on deficiency and excess, spleen and kidney deficiency is deficiency, phlegm, turbidity, stasis, toxin and other pathological products are excess.

3. Traditional Chinese medicine treatment

The pathogenesis of MS is complex and the clinical manifestations are diverse. Western medicine treatment aims to reduce body weight, control blood glucose and blood pressure, improve dyslipidemia and insulin resistance. There are problems such as unsatisfactory efficacy, large side effects, and single target. Different from the group treatment of Western medicine, Traditional

Chinese medicine based on the overall concept and the concept of syndrome differentiation and treatment for MS can effectively improve clinical symptoms, delay disease progression, and is safe and easy to be accepted by patients [9].

3.1 Treatment based on syndrome differentiation

Shi Yan [10] believes that spleen deficiency and dampness is the key to the pathogenesis of MS. The treatment is mainly based on invigorating spleen and removing dampness. The prescription is Shenling Jianpi Huashi Decoction (drug composition : Codonopsis, Fried Atractylodes, Alisma, Yam, Coix Seed, Poria, Lotus Leaf, Amomum, Notoginseng, with blood stasis symptoms, plus Chuanxiong, Salvia miltiorrhiza, phlegm and fire disturbing the heart, plus raw Longmu, Mother of Pearl, phlegm heat stagnation lung, plus Gualou, Fritillary). Xian Feng [11] believes that the pathogenesis of MS is mainly spleen deficiency and phlegm heat. The clinical treatment is to resolve phlegm, clear heat and invigorate the spleen. The prescription is Huanglian Wendan Decoction (drug composition: Coptis chinensis, tangerine peel, bamboo shavings, Poria cocos, Pueraria lobata, Astragalus membranaceus, Salvia miltiorrhiza, licorice). Zhang Liping [12] believes that the key to the pathogenesis of MS is that the spleen fails to transport and the liver fails to disperse. The treatment is based on the principle of soothing the liver and strengthening the spleen, and the prescription is Chaiqi Decoction (drug composition: Huangqi, Chaihu, Baizhu, Zhishi, Sanqi). Chen Bojun [13] believes that MS is mostly caused by stagnation of liver qi, and phlegm turbidity and blood stasis as pathological products will aggravate stagnation of qi. The treatment focuses on dredging liver qi, accompanied by resolving phlegm and activating blood circulation. Shugan Wendan Decoction (drug composition : white peony root, bamboo shavings, poria cocos, salvia miltiorrhiza, bupleurum, dried tangerine peel, citrus aurantium, Pinellia ternata, licorice). Huang Ting [14] believes that the Traditional Chinese medicine disease location of MS is in the gastrointestinal tract, and advocates the use of Gegen Qinlian Decoction (drug composition : Gegen, Huangqin, Huanglian, Ganjiang, Sanqi powder) to treat MS patients with gastrointestinal damp-heat type. Chen Baiqian [15] believed that phlegm and heat are the core pathogenesis of MS. Huanglian Wendan Decoction and Dachaihu Decoction (drug composition : Chaihu, Huanglian, Chenpi, Danshen, Banxia, Zhuru, Zhishi, Huangqin, Baishao, Zhigancao, Dahuang, Sanqi) have the effects of promoting blood circulation and removing blood stasis, clearing heat and detoxification, resolving phlegm and liver, soothing and relieving depression, which can effectively prevent the development of the disease.

3.2 Special prescription treatment

Wang Zhenqiang [16] randomly divided 190 MS patients into two groups. The control group using diet, exercise intervention. On the basis of the control group, the observation group was given oral Jianpi Qinghua Recipe (drug composition: Huangqin, Huanglian, Dangshen, Guijiayu, Shanyao, Huangjing, Huangqi, Gegen). Results : The glycosylated hemoglobin, 2 h postprandial blood glucose, insulin resistance index, tumor necrosis factor- α , interleukin-6 and carotid intima-media thickness of the two groups were lower than those before treatment. The total effective rate of the observation group was 84.2 % higher than that of the control group 70.53 %. Zhang Haili [17] randomly divided 76 MS patients into two groups. The control group was given diet and exercise guidance and oral placebo. The treatment group was given Traditional Chinese medicine compound on the basis of the control group (drug composition: hawthorn, pueraria, salvia miltiorrhiza, alisma, atractylodes, medlar, poria cocos, dangshen, notoginseng, coix seed, cassia seed). Results: The body mass index, blood pressure, blood glucose, blood lipid, glycosylated hemoglobin and insulin levels in the treatment group were significantly improved. Yang Jing [18] developed Qishan sugar-free granules for the most common spleen deficiency and phlegm-dampness syndrome and phlegm-heat syndrome in MS

patients. The study found that the fasting blood glucose, 2h postprandial blood glucose, glycosylated hemoglobin, triglyceride, total cholesterol and low-density lipoprotein levels of the Qishan Sugar-free Granules group (drug composition : raw astragalus, yam, atractylodes, poria, pueraria, gynostemma pentaphyllum, fried citrus aurantium, raw hawthorn, chuanxiong, rhubarb, coptis) were significantly lower than those of the metformin group, and the difference was statistically significant. Wang Gaolei [19,20] have confirmed through two random experiments that Yunpi Huazhuo Granules (drug composition : Rhizoma Coptidis, Radix Notoginseng, Rhizoma Pinelliae Preparata, Radix Scutellariae, Radix Curcumae, Rhizoma Zingiberis, Radix Codonopsis, Radix Salviae Miltiorrhizae, Radix Paeoniae Alba, Fructus Crataegi, Semen Coicis, Rhizoma Ligustici Chuanxiong, Radix Glycyrrhizae) have more advantages than metformin tablets in improving Traditional Chinese medicine symptoms, reducing body weight, waist circumference, fasting blood glucose, fasting insulin, insulin resistance index, triglyceride, aspartate aminotransferase, uric acid and reducing visceral fat in MS patients with stomach heat and spleen stagnation.

3.3 Acupuncture treatment

Acupuncture treatment is one of the characteristic therapies of Traditional Chinese medicine. It mainly plays the role of dredging meridians, communicating inside and outside, and reconciling viscera by acupuncture meridians and acupoints. Lü Zhanqiang [21] believes that MS patients are mostly due to the lack of spleen yang in the body, coupled with improper diet, overeating and cold, resulting in spleen dysfunction, water and grain essence loss in the distribution, and water and dampness stop in the body. He advocates the treatment of MS with cold and dampness trapped spleen by acupuncture. He compared the treatment of Hewei Yunpi acupuncture (acupoints : Zhongwan, Tianshu, Daheng, Shuidao, Zusanli, Fenglong, Neiting, Taichong, Yinlingquan, Sanyinjiao) with basic western medicine. Results: The total effective rate of the former was 94.73 %, which was significantly higher than that of the latter 56.25 %. After treatment, the blood pressure, blood lipid and blood glucose indexes of the two groups were improved, and the improvement of the former was more obvious. Xiao Yiping [22] randomly divided 64 MS patients with phlegm-dampness constitution into two groups. The treatment group was treated with conventional western medicine combined with acupuncture (bilateral Tianshu, bilateral Sanyinjiao, bilateral Zusanli, Zhongwan, Guanyuan, bilateral Fenglong, water). Results : The fasting blood glucose, 2 h postprandial blood glucose and insulin resistance index of the two groups were lower than those before treatment, and the treatment group was better than the control group. In recent years, studies have shown that adipose tissue is no longer a simple energy reservoir, but also an important immune tissue and endocrine organ of the body [23]. Adipocytokines such as adiponectin, leptin, resistin, interleukin-6, tumor necrosis factor- α , and visfatin have been shown to cause chronic inflammation, induce insulin resistance, abnormal glucose and lipid metabolism and other multiple metabolic abnormalities[24-26]. Therefore, intervention in obesity can effectively delay the progression of MS. Shi Hao [27] randomly divided 60 obese patients with spleen deficiency and dampness obstruction into control group (given diet control and exercise intervention) and treatment group (acupuncture on the basis of control group, acupoint selection : Zhongwan, Tianshu, Zusanli, Yinlingquan, Fenglong, Sanyinjiao, Qihai, Guanyuan, Shuifen, Daimai, Daheng, Shuidao). Results : The total effective rate of the treatment group (86.7 %, 26 / 30) was higher than that of the control group (56.7 %, 17 / 30), and the difference was statistically significant. The improvement of obesity index (waist circumference, hip circumference, waist hip ratio, body weight, body mass index, body fat rate) lipid index (triglyceride, total cholesterol, low density lipoprotein, high density lipoprotein) and insulin sensitivity index (fasting blood glucose, fasting insulin, insulin resistance index) in the treatment group was better than that in the control group.

4. Issues and prospects

The pathogenesis of MS is complex and the clinical manifestations are diverse. Based on the clinical research literature of Traditional Chinese medicine in the treatment of MS, the methods of syndrome differentiation and treatment, special prescription treatment and acupuncture treatment can effectively alleviate the clinical symptoms of patients, improve the detection indexes of blood glucose, blood lipid and blood pressure, and show the broad prospect of Traditional Chinese medicine in this research field. At the same time, the above clinical research still has many shortcomings. The review found that most clinical studies were limited to single-center, small-sample, non-double-blind clinical observations, and the reliability and repeatability of the results were questionable. Secondly, based on the clinical research of Traditional Chinese medicine syndrome differentiation and treatment of MS, there is a lack of unified Traditional Chinese medicine syndromes and efficacy evaluation criteria, which makes the results lack universality. In view of the above-mentioned core problems that need to be solved in the diagnosis and treatment of MS, multi-center, large-sample, high-quality randomized controlled trials or real-world studies should be carried out to promote the formation of a unified diagnosis and treatment standard for MS. Secondly, it is necessary to combine the overall dialectics of Traditional Chinese medicine with the identification of disease pathophysiology [28]. On the basis of macro dialectics of Traditional Chinese medicine, modern scientific and technological means are used to study the internal physiological and pathological changes of MS syndromes, so as to provide quantifiable dialectical basis for clinical practice.

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