

Discussion on Comprehensive Treatment Strategy of Hypertension Complicating Pregnancy based on Integration of Traditional Chinese and Western Medicine

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Abstract: Hypertension during pregnancy (HDP) is one of the common and serious complications during pregnancy. Its etiology involves placental dysfunction, vascular endothelial injury, immune disorder and oxidative stress, and its pathogenesis is complex. Western medicine believes that the treatment of HDP is mainly based on drug intervention, but it has limitations and side effects. Traditional Chinese medicine, on the basis of syndrome differentiation and treatment, combines traditional Chinese medicine for internal and external use, and combines acupuncture, moxibustion and other methods to effectively improve the circulation of qi and blood and the function of internal organs. The combination of traditional Chinese and Western medicine fully reflects the respective therapeutic advantages of traditional Chinese and Western medicine, and has shown significant efficacy in clinical practice. At the same time, it can effectively reduce the side effects of Western medicine treatment and improve maternal and infant safety. Through further analysis of experimental studies on the combination of traditional Chinese and Western medicine for the treatment of hypertension during pregnancy, the mechanism of action of Chinese medicine monomers and compounds in regulating oxidative stress, inflammatory factors and vascular function is revealed, which provides a scientific basis for the treatment of HDP by combining traditional Chinese and Western medicine. However, the integrated Chinese and Western medicine treatment model still faces challenges in the individualized treatment of HDP. In the future, multi-center large-sample clinical studies are still needed to further verify its efficacy and safety, so as to optimize the diagnosis and treatment plan and promote the widespread application of integrated Chinese and Western medicine treatment, and provide more comprehensive and effective health protection for HDP patients.

Keywords: Integrated Chinese and Western medicine, Hypertension during pregnancy, Review.

1. Introduction

Hypertensive Disorders of Pregnancy (HDP) is one of the most common complications of pregnancy [1]. It refers to high blood pressure that occurs after 20 weeks of pregnancy. Usually, the blood pressure level reaches $\geq 140/90$ mmHg and returns to normal after delivery. It usually includes four categories: gestational hypertension, preeclampsia/eclampsia, pregnancy complicated by chronic hypertension, and chronic hypertension complicated by preeclampsia. Preeclampsia is characterized by hypertension and multi-system dysfunction, which may cause serious maternal and fetal complications; chronic hypertension refers to hypertension that already exists before pregnancy or is discovered before 20 weeks of pregnancy [2]. HDP not only has a high incidence rate, but also poses a major threat to maternal and fetal health, and may lead to adverse consequences such as placental abruption, fetal growth restriction, premature birth, and even maternal and fetal death [3].

Currently, there are still certain limitations in the treatment of HDP. Although Western medicine can effectively control blood pressure in the short term, long-term use may cause side effects and be detrimental to fetal health. Non-drug treatments such as dietary intervention alone have limited effect in controlling the disease. Therefore, finding a safer and more effective treatment method has become a current problem, and the combination of Chinese and Western medicine has shown potential advantages [4]. Chinese medicine emphasizes syndrome differentiation and treatment,

combined with individual characteristics, to achieve the purpose of regulating body functions through internal and external treatment; while modern medicine is good at accurate diagnosis and rapid intervention. Combining Chinese and Western medicine treatment can not only give full play to the high efficiency of modern medicine, but also utilize the overall regulatory effect of Chinese medicine to control HDP while reducing side effects, providing double protection for maternal and fetal health. Therefore, the research on the combination of Chinese and Western medicine to treat gestational hypertension is not only of theoretical significance, but also likely to provide new solutions for clinical practice [5]. In the process of exploring the combination of Chinese and Western medicine treatment, not only can the clinical treatment effect of HDP be improved, but also the deep integration of traditional medicine and modern medicine can be promoted, making positive contributions to improving the health level of pregnant women.

2. Pathogenesis and Pathophysiology of Gestational Hypertension

2.1 Causes and Mechanisms from the Perspective of Western Medicine

From the perspective of Western medicine, the causes of HDP mainly include the following aspects: In early pregnancy, normal placental formation depends on the invasive growth of trophoblastic cells, which can transform the mother's uterine spiral arteries to ensure blood supply to the placenta and fetus.

However, in gestational hypertension, especially preeclampsia, the invasive ability of trophoblastic cells is significantly reduced, the transformation of uterine spiral arteries is incomplete, the vascular lumen is narrowed, and the blood flow resistance is increased [6], which causes the placenta to be in a state of chronic hypoxia for a long time, leading to a series of pathophysiological reactions. Secondly, endothelial cell dysfunction plays a key role in the occurrence of HDP. The placenta in a hypoxic state will release excessive anti-angiogenic factors such as vascular endothelial growth factor receptor 1 (VEGF receptor 1, VEGF1) and pro-inflammatory factors such as interleukin-1 β (IL1 β). These factors enter the maternal circulation through the blood, causing damage to maternal vascular endothelial cells, aggravating vasoconstriction, inflammatory response and procoagulant state, leading to increased blood pressure and multi-organ involvement [7]. In addition, abnormal regulation of the immune system is also one of the important factors in the development of HDP. HDP patients may have an imbalance in immune regulation. In early pregnancy, the maternal immune system needs to form adaptive immune tolerance to the fetus and placenta. If the mother's immune rejection reaction to the placenta and fetus is enhanced, it will aggravate the dysfunction of the placenta, forming a vicious circle. In addition, genetic factors cannot be ignored in the development of HDP. Mutations in genes related to angiogenesis and inflammation may increase the susceptibility to HDP. Environmental factors such as obesity, metabolic syndrome, smoking, and lack of exercise are also high-risk factors for HDP, which increase the risk of disease by affecting vascular function and metabolic status [8].

The pathogenesis of HDP also includes immune disorders and oxidative stress. Among them, oxidative stress plays an important role in the occurrence of gestational hypertension. The placenta of HDP patients is in a state of hypoxia, which leads to excessive generation of reactive oxygen species (ROS), which exceeds the clearance capacity of the antioxidant system and ultimately leads to oxidative stress. Oxidative stress not only aggravates endothelial dysfunction, but also further deteriorates placental function by inducing cell apoptosis and damaging placental tissue [9]. In addition, oxidative stress also promotes the release of proinflammatory factors, aggravating local and systemic inflammatory responses, thus forming a vicious cycle. The role of inflammatory factors is also significant in HDP. When the placenta is in a hypoxic state, it will produce pro-inflammatory factors such as tumor necrosis factor- α (TNF- α) and interleukin 6 (IL-6). After entering the maternal circulation, the inflammatory factors will further damage vascular endothelial cells, promote vasoconstriction and abnormal coagulation function. At the same time, inflammatory factors will also act on immune cells to disrupt the immune balance of the mother, further aggravating the immune disorder. Excessive inflammatory response not only damages the health of the mother, but also poses a potential threat to the development of the fetus [10]. In short, from the perspective of Western medicine, the pathogenesis of HDP involves the synergistic action of multiple factors, which jointly participate in the occurrence and development of the disease. In-depth research is still needed in the future to seek

more effective solutions.

2.2 Etiology and Pathogenesis from the Perspective of Traditional Chinese Medicine

Traditional Chinese medicine believes that the etiology of HDP includes factors such as constitutional deficiency, emotional disharmony, organ dysfunction, and unhealthy diet [11]. Constitutional deficiency is also a susceptibility factor. During pregnancy, due to the needs of fetal growth and development, kidney essence is consumed in large quantities. If the pregnant woman has a weak constitution or has conditions such as yang hyperactivity or yin deficiency, she is more likely to have problems with liver yang hyperactivity or qi and blood deficiency. Emotional disharmony is an important cause of gestational hypertension. During pregnancy, pregnant women have large mood swings and are in a state of anxiety, depression, or anger for a long time, which leads to liver dysfunction, liver qi stagnation, qi stagnation, and high blood pressure. In addition, if pregnant women consume excessive amounts of spicy, heavy, and other foods that are difficult to digest, they may damage the spleen and stomach, causing the spleen to lose its healthy function and water and moisture to stagnate, thereby affecting the circulation of qi and blood. In addition, pregnancy has special physiological changes. The increased supply of qi and blood to the fetus can also lead to potential physical problems, thereby inducing diseases.

According to TCM, the pathogenesis of HDP is centered on hyperactivity of liver yang, stagnation of qi and blood stasis, and imbalance of yin and yang [12]. Hyperactivity of liver yang is one of the main pathogenesis of HDP. The liver is responsible for regulating qi, and emotional disorders can easily lead to liver failure to regulate qi, stagnation of liver qi and transformation into fire. Insufficient kidney yin makes it difficult to restrain liver yang, which further promotes hyperactivity of liver yang, leading to symptoms such as dizziness, vertigo, and abnormally high blood pressure. Stagnation of qi and blood stasis are also important pathogenesis of HDP. During pregnancy, poor circulation of qi and blood leads to qi deficiency or stagnation, which results in weak or blocked blood circulation, making it difficult to meet the needs of the fetus, forming blood stasis, obstructing the circulation of blood vessels, and causing symptoms such as headache and heaviness of limbs, and even severe increase in blood pressure. Finally, imbalance of yin and yang runs through the entire pathogenesis process. During pregnancy, kidney essence is depleted, kidney yin is insufficient, and it is difficult to balance yang qi, which can easily lead to yin deficiency and hyperactivity of fire, which damages qi and blood, forming a vicious cycle. In addition, internal obstruction of phlegm and dampness caused by spleen dysfunction may also aggravate the condition. Phlegm and dampness obstruct blood circulation and aggravate qi stagnation and blood stasis. These pathological factors often interact with each other and lead to the occurrence and development of HDP. Grasping the etiology and pathogenesis of HDP patients through a holistic concept provides a treatment direction for restoring the balance of qi, blood, yin and yang in pregnant women.

3. Current Status of Combined Traditional Chinese and Western Medicine in the Treatment of Gestational Hypertension

3.1 Western Medicine Treatment Options

In terms of treatment, Western medicine mainly uses drug intervention to control HDP and prevent complications. Commonly used antihypertensive drugs include labetalol, methyldopa, and nifedipine, which can effectively lower blood pressure and are safe [13]. In addition, magnesium sulfate can be used to prevent and treat convulsions in preeclampsia and can also dilate blood vessels. For high-risk patients with thrombosis risk, anticoagulants such as low molecular weight heparin are also used to reduce the risk of thrombosis. These treatment options have played a significant role in relieving acute symptoms and preventing worsening of the disease [14].

However, some antihypertensive drugs may cause maternal discomfort such as hypotension, dizziness, and fatigue; the amount of magnesium sulfate used needs to be strictly monitored to prevent respiratory depression or abnormal cardiac function. In addition, the safety of drug treatment for the fetus has not been fully clarified, and the long-term effects still need further study. Western medicine treatment mainly targets symptom control rather than the root cause of the disease, and cannot comprehensively improve the disease. Drug treatment lacks the flexibility of individual adjustment. It is difficult to adapt to the specific conditions of different patients based on standard doses. These limitations suggest that other treatment methods need to be combined to make up for them [15].

3.2 TCM Treatment Methods

TCM treatment of HDP mainly relies on syndrome differentiation and treatment, and selects empirical prescriptions according to the patient's specific symptoms and constitution. Common symptoms include dizziness, vertigo, irritability, heaviness of limbs, and increased blood pressure. For example, Tianma Gou Teng Yin is suitable for patients with HDP with hyperactivity of liver yang, which can calm the liver and suppress yang, relieve symptoms of dizziness and irritability; Liuwei Dihuang Wan is suitable for patients with HDP with deficiency of kidney yin, which can nourish yin and tonify the kidney, improve symptoms such as soreness of waist and knees, dizziness, and insomnia; Taohong Siwu Tang is suitable for patients with HDP with qi stagnation and blood stasis, which can activate blood circulation and remove blood stasis, relieve symptoms of numbness of limbs and poor blood circulation; Shenling Baizhu San is suitable for patients with HDP with spleen deficiency and dampness, which can help strengthen the spleen and replenish qi, remove dampness and resolve phlegm, and help relieve heaviness and edema of limbs. In clinical practice, representative prescriptions are often modified according to the specific conditions of the patients to improve the efficacy, while also paying attention to protecting the health of the fetus and avoiding the adverse effects of drugs on the fetus [16].

Acupuncture and massage, as well as other TCM adjuvant therapies, also play a positive role in the treatment of HDP

[17]. Acupuncture can regulate the flow of qi and blood, balance yin and yang, and relieve anxiety and emotional instability by stimulating specific acupoints such as Taichong, Hegu, and Zusanli. Massage stimulates meridians and acupoints through manipulation to promote the circulation of qi and blood and improve vascular tension. These therapies are safe and non-invasive and are suitable for patients with poor tolerance to drug treatment. TCM treatment is characterized by holistic concepts and syndrome differentiation and treatment, which provides a systematic approach to the treatment of HDP. It can also reduce the side effects of drugs and provide a double guarantee for the health of the mother and the fetus.

3.3 Advantages of Combined TCM and Western Medicine Treatment

The combined treatment of HDP with TCM and Western medicine gives full play to the advantages of TCM holistic regulation and Western medicine rapid intervention, and is particularly outstanding in improving the overall condition of patients [18]. Through syndrome differentiation and treatment, TCM can use TCM prescriptions such as Tianma Gou Teng Yin and Liuwei Dihuang Wan to adjust the flow of qi and blood, balance yin and yang, and thus improve the overall function of the body according to the different individual symptoms of the patient. In addition, combined with other TCM therapies such as acupuncture and massage, it can dredge the meridians, regulate emotions, further optimize the patient's overall state, and reduce the risk of complications of pregnancy-induced hypertension. At the same time, Western medicine can stabilize blood pressure and ensure maternal and fetal health through the rational use of antihypertensive drugs and anticoagulants. Through the combination of Chinese and Western medicine, the overall treatment effect can be complementary. In addition, the combination of Chinese and Western medicine has obvious advantages in reducing the dosage of Western medicine and its side effects. Chinese medicine has the characteristics of mild regulation, which can improve the cause of the disease and reduce dependence on Western medicine, thereby reducing the adverse reactions that may be caused by antihypertensive drugs, anticoagulants, etc. The TCM treatment of promoting blood circulation and removing blood stasis can improve vascular function and relieve the hypercoagulable state of blood, thereby reducing the frequency of anticoagulant use; while Western medicine can provide a stable foundation for TCM conditioning, making the treatment effect more lasting. The synergistic use of the two can effectively control symptoms and provide a better treatment option for HDP patients.

4. Clinical Practice and Research Progress of Integrated Chinese and Western Medicine in the Treatment of HDP

4.1 Clinical Research and Case Analysis

In recent years, the clinical practice and research of integrated Chinese and Western medicine in the treatment of HDP have made significant progress. Clinical research data show that this combined treatment shows good efficacy in improving patient symptoms, controlling blood pressure levels and reducing complications [19-20]. Studies have shown that the

combined application of Chinese medicine prescriptions such as Tianma Gou Teng Yin and Liuwei Dihuang Wan on the basis of traditional Western medicine treatment can effectively lower the blood pressure of HDP patients and improve symptoms such as headache and dizziness. The addition of acupuncture therapy further improves the overall effect of clinical treatment by balancing yin and yang and regulating qi and blood. The results of the randomized controlled trial showed that the blood pressure control effect of the integrated Chinese and Western medicine treatment group was better than that of the Western medicine group alone, and the maternal and infant safety was high, and the incidence of adverse events did not increase significantly. In addition, the study designed individualized treatment plans for different types of HDP patients, combining syndrome differentiation and treatment with modern medical examinations, and significantly improved the efficacy. After receiving Tianma Gouteng Decoction combined with magnesium sulfate, the blood pressure of patients with preeclampsia dropped rapidly and no convulsions occurred. At the same time, Chinese medicine regulation improved the patient's sleep quality and emotional state. These successful cases show that the combination of Chinese and Western medicine can start from multiple aspects, while controlling acute symptoms and improving the overall health of patients, providing a more comprehensive solution for treatment. In summary, the clinical practice of combining Chinese and Western medicine to treat gestational hypertension has accumulated rich experience and data, and its efficacy has been widely recognized. However, to further improve the standardization and scientificity of promotion and application, it is still necessary to verify its long-term efficacy and safety through larger-scale, multi-center clinical studies. This treatment model provides new ideas for HDP and has made important contributions to the protection of maternal and fetal health.

4.2 Animal Experiments and Laboratory Studies

In recent years, many advances have been made in the study of the mechanism of action of Chinese medicine monomers and compounds in the HDP model. In animal experiments, researchers often use the rat HDP model as a basis to explore the biological effects of Chinese medicine intervention [21]. For example, the Chinese medicine monomer baicalin has been shown to have antioxidant effects, which can reduce ROS levels, improve endothelial cell function, and thus reduce multi-organ damage caused by hypertension [22]. In addition, basic research has shown that Tianma Gou Teng Yin has the effects of stabilizing blood pressure, regulating vascular tension, and improving placental blood flow. Experimental results have confirmed that it may relieve HDP-related symptoms by downregulating the level of proinflammatory factors and restoring vascular endothelial function [23]. In addition, laboratory studies have further revealed the potential regulatory effects of Chinese medicine on the molecular mechanism of HDP. Studies have found that Chinese medicine can improve vasoconstriction function by regulating the balance of nitric oxide and endothelin-1. Certain components in Chinese medicine, such as tanshinone and puerarin, have been shown to inhibit oxidative stress responses and protect endothelial cells from damage, providing important theoretical support for the treatment of

HDP [24-25]. These experimental studies provide a reliable scientific basis for the promotion and application of Chinese medicine in clinical practice.

4.3 Existing Difficulties and Challenges

Although the potential of combining traditional Chinese and Western medicine to treat HDP has been preliminarily confirmed, there are still some difficulties and challenges in practical application. First, there are the safety and standardization issues of traditional Chinese medicine. Due to the special physiological state of pregnant patients, the safety requirements of traditional Chinese medicine are extremely high. Secondly, there are great challenges in the clinical promotion of the combination of traditional Chinese and Western medicine treatment. How to effectively integrate the unified diagnosis and treatment standards of modern medicine with the diversity of traditional Chinese medicine syndrome differentiation and treatment is an urgent problem to be solved. At the same time, the optimal dose and combination of traditional Chinese and Western medicine need to be clarified through larger-scale clinical studies.

In summary, the combination of traditional Chinese and Western medicine in the treatment of HDP shows broad prospects, but to achieve the full promotion of its clinical application, it is necessary to overcome many challenges in terms of safety, standardization and individualized diagnosis and treatment. The solution of these problems will provide important support for further improving the treatment effect and safety of HDP patients.

5. Conclusion

The combination of traditional Chinese and Western medicine in the treatment of HDP can not only improve vascular endothelial function, relieve oxidative stress and inflammatory response, but also effectively lower blood pressure, reduce the dosage of Western medicine and its possible side effects, showing significant clinical application potential. At the same time, through acupuncture, massage and other traditional Chinese medicine auxiliary therapies, the treatment effect can be enhanced and the health of the mother and fetus can be optimized. Early intervention and individualized treatment are particularly critical in controlling disease progression and preventing complications. Precision treatment based on the patient's specific constitution and pathogenesis can significantly improve maternal and fetal safety. In the future, more multicenter, large-scale clinical studies are needed to further verify the efficacy and safety of combined Chinese and Western medicine treatment and optimize its standardized regimen, thereby promoting the widespread application of this comprehensive treatment model in the management of hypertension during pregnancy and providing more comprehensive protection for maternal and fetal health.

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