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Research Progress on the Mechanism of Huangqi Guizhi Wuwu Decoction in Treating Diabetic Peripheral Neuropathy

Siyun Zhang[1], Yuhong Duan[2,*]

[1]Shaanxi University of Chinese Medicine, Xianyang 712046, Shaanxi, China
[2]Affiliated Hospital of Shaanxi University of Chinese Medicine, Xianyang 712000, Shaanxi, China
**Correspondence Author*

Abstract: ***Diabetic peripheral neuropathy (DPN) is a common chronic complication of diabetes mellitus, characterized by high incidence and significant harm. Modern medicine primarily focuses on blood glucose control, neurotrophy, and antioxidation, but its efficacy is limited, and adverse reactions are numerous. In traditional Chinese medicine, DPN falls under the categories of "Arthralgia due to Blood Stasis" (Bi disease), "Arthralgia Syndrome" (Bi syndrome), and "Flaccidity Syndrome" (Wei syndrome). The core pathogenesis is Qi deficiency and blood stasis, with deficiency as the root and excess as the manifestation. Huangqi Guizhi Wuwu Decoction, originating from the Synopsis of the Golden Chamber (Jin Gui Yao Lue), is composed of Astragali Radix (Huangqi), Cinnamomi Ramulus (Guizhi), Paeoniae Radix Alba (Shaoyao), Zingiberis Rhizoma Recens (Shengjiang), and Jujubae Fructus (Dazao). Its functions are to supplement Qi and harmonize blood, warm the meridians and unblock collateral stasis, which aligns with the TCM pathogenesis of DPN. Modern research has confirmed that this formula acts through multiple targets and pathways, including anti-inflammation, immunomodulation, neurotrophic repair, and anti-oxidative stress. It can reduce inflammatory cytokine levels, improve nerve conduction velocity, and alleviate nerve injury. In clinical practice, when used alone or combined with Western medicines such as mecobalamin or epalrestat for treating DPN, it shows superior efficacy and higher safety compared to Western medicine alone. This article systematically reviews the TCM theory, pharmacological mechanisms, and clinical research progress of Huangqi Guizhi Wuwu Decoction in treating DPN, providing a theoretical basis and research ideas for the prevention and treatment of DPN with TCM.***

Keywords: Diabetic peripheral neuropathy, Huangqi Guizhi Wuwu Decoction, Mechanism of action, Traditional Chinese medicine therapy, Clinical research**.**

1. Introduction

Diabetic peripheral neuropathy (DPN) is a common complication of diabetes mellitus. Its pathogenesis is complex, and no specific mechanism has been clearly identified. DPN refers to the development of peripheral nerve dysfunction in diabetic patients when other causes are excluded. As one of the most common complications of diabetes, the incidence of DPN increases with the duration of diabetes. Research indicates that painful DPN affects approximately 6-34% of diabetic patients. The pain caused by DPN reduces quality of life and makes daily activities difficult [1]. Bilateral limb pain, numbness, and sensory loss are the most common clinical manifestations in DPN patients. In severe cases, foot ulcers may occur, potentially leading to amputation [2]. The etiology and pathogenesis of diabetic neuropathy have not been fully elucidated. However, hyperglycemia, lipid metabolism disorders, and abnormal insulin signaling pathways are currently considered initiating factors for a series of pathophysiological changes in DPN [3]. Modern medicine primarily focuses on stabilizing blood glucose control for DPN treatment, combined with symptomatic treatments such as anti-oxidative stress, improving microcirculation, nerve nutrition, regulating metabolic disorders, and relieving pain. However, these treatments easily cause adverse reactions such as dizziness, drowsiness, and drug addiction, and their efficacy is often unsatisfactory [4]. Therefore, finding safer and more effective treatment options is of great significance. Clinical research and practice have confirmed that TCM has unique advantages in treating arthritis. It can not only effectively relieve patient pain but also reduce the adverse reactions of Western medicine treatments.

DPN treatment mainly focuses on nerve nutrition and improving microcirculation. Common drugs include mecobalamin, epalrestat, and other medications that nourish nerves and relieve pain. However, current clinical medications are prone to causing drug resistance, and no new drugs are available to completely cure DPN. TCM treats diseases through multiple targets and pathways, showing good efficacy for chronic diseases like DPN.

Based on its clinical manifestations, DPN is classified into TCM syndrome categories such as "Arthralgia Syndrome" (Bi syndrome), "Arthralgia due to Blood Stasis" (Xue Bi), and "Flaccidity Syndrome" (Wei syndrome) [5]. In the Plain Questions: Discussion on Strange Diseases (Su Wen · Qi Bing Lun), it is stated that "Fatty foods cause internal heat, sweet foods cause middle fullness, hence the Qi overflows upwards, transforming into wasting-thirst disorder (Xiao Ke)," where the disease name "Wasting-Thirst" (Xiao Ke) first appeared. In the Essentials of Syndrome and Treatment (Zheng Zhi Yao Jue), it is recorded that "In prolonged stages of the three wasting-thirst patterns, one may experience either loss of vision or hemiplegia," indicating an early understanding of the clinical manifestations of wasting-thirst. The Plain Questions: Discussion on Arthralgia (Su Wen · Bi Lun) states, "The mixed arrival of wind, cold, and dampness pathogens together causes arthralgia (Bi)." The Teachings of Danxi (Dan Xi Xin Fa) records: "Kidney deficiency leads to soreness and pain in the legs, knees, and joints" [6]. The TCM pathogenesis of DPN can be summarized as follows: First, deficiency as the root and excess as the manifestation. The root deficiency lies in insufficiency of both Qi and Yin, leading to damage of Yin fluids accompanied by internal deficient heat. The excess

manifestation is due to blockage by phlegm turbidity and blood stasis, where phlegm and stasis intertwine, causing blockage of the meridians and vessels. Second, blockage by pathogenic factors. The invasion of wind, cold, and dampness pathogens into the limbs and meridians causes numbness, pain, and restricted flexion and extension of the joints. Therefore, this article elaborates on the pathogenesis of DPN from both Western and Chinese medical perspectives and discusses the specific mechanisms of Huangqi Guizhi Wuwu Decoction in treating DPN, aiming to provide ideas for TCM research on the prevention and treatment of DPN [7].

2. TCM Theory of Huangqi Guizhi Wuwu Decoction in Treating DPN

2.1 TCM Theory of DPN Occurrence

DPN is a Western medical diagnosis. Peripheral arterial and venous circulatory disorders lead to insufficient blood supply to the peripheral nerves, causing neuropathy. In TCM, it falls under categories such as “Arthralgia due to Blood Stasis” (Xue Bi), “Flaccidity Syndrome” (Wei syndrome), “Arthralgia Syndrome” (Bi syndrome), and “Pain Syndrome” (Tong syndrome), with main manifestations including pain, swelling, numbness of the limbs, and sensory loss. DPN corresponds to the “Arthralgia due to Blood Stasis” (Xue Bi) disease in the Synopsis of the Golden Chamber: Blood Stasis and Deficiency Diseases (Jin Gui Yao Lue · Xue Bi Xu Lao Bing Pian). Blood stasis arthralgia is divided into mild and severe cases. Mild cases correspond to a milder condition of Yang Qi stagnation. Yang Qi stagnation leads to Qi and blood coagulation, causing numbness of the skin and muscles. As the condition progresses to severe cases, the degree of Qi and blood stasis deepens and worsens. When there is stasis, there is pain, leading to numbness accompanied by pain and swelling, and even sensory loss. Overall, DPN corresponds to the TCM pathological state of severe Qi deficiency and blood stasis.

2.2 Composition and Compatibility of Huangqi Guizhi Wuwu Decoction

Huangqi Guizhi Wuwu Decoction was recorded by Zhang Zhongjing of the Han Dynasty in the Synopsis of the Golden Chamber (Jin Gui Yao Lue). This formula consists of five medicinal herbs: Astragali Radix (Huangqi), Paeoniae Radix Alba (Shaoyao), Cinnamomi Ramulus (Guizhi), Zingiberis Rhizoma Recens (Shengjiang), and Jujubae Fructus (Dazao). Its main functions are to supplement Qi and harmonize blood, warm the meridians and unblock collateral stasis, making it particularly suitable for treating patterns of blood deficiency arthralgia. Blood stasis arthralgia often presents with numbness of the skin and muscles, mild aversion to wind and cold, a pale tongue, and a faint, hesitant, and tight pulse. In the formula, Astragali Radix (Huangqi), sweet and warm in nature, supplements Qi and tonifies the exterior Qi, serving as the sovereign herb. Cinnamomi Ramulus (Guizhi), pungent and warm, disperses wind-cold and warms the meridians to unblock stasis, acting as the minister herb. With Guizhi, Astragali Radix supplements Qi and invigorates the defensive Yang. With Astragali Radix, Guizhi secures the exterior without retaining pathogens. Paeoniae Radix Alba (Shaoyao) nourishes blood and harmonizes the nutritive Qi, moistening the skin and muscles to unblock blood stasis. When combined with Guizhi, it harmonizes the nutritive and defensive Qi and harmonizes the exterior and interior, jointly serving as minister herbs. Zingiberis Rhizoma Recens (Shengjiang), pungent and warm, disperses wind pathogens to assist the effect of Guizhi, acting as an assistant and envoy herb. Jujubae Fructus (Dazao), sweet and warm, supplements Qi and nourishes blood to support the effects of Astragali Radix and Paeoniae Radix Alba. When paired with Shengjiang, it also harmonizes the nutritive and defensive Qi and harmonizes all herbs, acting as an assistant and envoy herb. Modern pharmacological studies have shown that, in Huangqi Guizhi Wuwu Decoction, Astragali Radix (Huangqi) has anti-aging effects, improves the body’s immune capacity, exerts anti-oxidative stress effects, and protects vascular endothelial cells [8]; Cinnamomi Ramulus (Guizhi) has antibacterial, neuroprotective, and analgesic effects; Paeoniae Radix Alba (Shaoyao) has immunomodulatory and anti-inflammatory effects; Zingiberis Rhizoma Recens (Shengjiang) has anti-inflammatory, antioxidant, anti-atherosclerotic, and analgesic effects [9]; and Jujubae Fructus (Dazao) can enhance immunity and maintain metabolic balance [10].

3. Pharmacological Mechanism Studies of Huangqi Guizhi Wuwu Decoction in Treating DPN

Current Western medicine treatments, besides basic therapies such as blood glucose control and prevention of cardiovascular diseases, mainly include etiological and symptomatic treatments. Etiological treatment is based on the pathogenesis of DPN, employing anti-oxidative stress, nerve repair, improvement of microcirculation, and regulation of metabolic disorders. Symptomatic treatment mainly involves oral or topical analgesics. The efficacy is not particularly outstanding, and long-term use is associated with many adverse reactions [21]. Therefore, finding safer and more effective treatment methods is an urgent problem to be solved. Current research has found that the mechanisms of Huangqi Guizhi Wuwu Decoction in treating DPN primarily involve anti-inflammation and immunomodulation, neurotrophy and repair, and anti-oxidative stress.

3.1 Anti-inflammation and Immunomodulation

Studies have shown that, under the influence of various factors in DPN patients, inflammatory pathways are the most important and common pathogenic mediators in the natural course of diabetes. Elevated concentrations of inflammatory and acute-phase reactant markers and mediators, including C-reactive protein, interleukin (IL)-6, and plasminogen activator inhibitor-1, confirm the epidemiological association between inflammation and type 2 diabetes [11]. Crook et al. also found increased levels of inflammatory markers such as TNF-α, C-reactive protein, and IL-6 in the serum of diabetic patients. Therefore, reducing the inflammatory immune response in diabetes and its complications plays an important role in the prevention and treatment of this disease [18].

Jia Yuru et al. [12] treated 55 DPN patients with oral Huangqi Guizhi Wuwu Decoction for 3 months. By comparing a series of evaluation criteria including numbness of hands and feet,

limb tingling, shortness of breath and reluctance to speak, fatigue and weakness, and scaly skin with no sensation upon pressing, they found that the degree of symptom relief was significantly better than that in the control group treated with oral mecobalamin tablets. They concluded that Huangqi Guizhi Wuwu Decoction has good therapeutic effects on DPN, effectively alleviating clinical symptoms and improving neurological function, possibly by inhibiting the expression of miR-146a and the MyD88/IκB signaling pathway, thereby reducing the release of inflammatory factors. Yin Danfeng et al. [13] used a combination of Huangqi Guizhi Wuwu Decoction and epalrestat, observing neurophysiological indicators such as motor nerve conduction velocity (MCV) and sensory nerve conduction velocity (SCV). They found that this combination effectively improved the levels of inflammatory factors in patients. The reasons for this are: in the Huangqi Guizhi Wuwu Decoction formula, Cinnamomi Ramulus (Guizhi) has the effect of promoting blood circulation and removing blood stasis, while Paeoniae Radix Alba (Shaoyao) has blood sugar-lowering and anti-inflammatory effects. The combination of the two unblocks meridians and collaterals, and exerts anti-inflammatory and immunomodulatory functions. Zhou Wen et al. [14] used animal experiments to demonstrate that Huangqi Guizhi Wuwu Decoction significantly reduced serum levels of IL-1β and TNF-α in rats, decreased the release of related inflammatory mediators, and alleviated inflammatory damage to nerve tissue.

3.2 Neurotrophy and Repair

Nerve growth factor (NGF) is a major neurotrophic factor, present in some tissue cells. It can protect, repair, and regenerate neurons, and inhibit neuronal apoptosis. Vascular endothelial growth factor (VEGF) can induce angiogenesis and vascular formation, as well as endothelial cell proliferation. It has the effect of promoting the regeneration of intraneural blood vessels and nerves. In DPN patients, persistent high glucose stimulation can damage Schwann cells, reduce NGF synthesis, and ultimately lead to the occurrence of DPN [15].

Lin Yunmei et al. [16] treated 50 clinical DPN patients with Modified Huangqi Guizhi Wuwu Decoction for 4 weeks, observing the recovery of nerve conduction velocity. The experiment showed that the motor and sensory conduction velocities of the common peroneal nerve and median nerve were higher in patients treated with Modified Huangqi Guizhi Wuwu Decoction than in the control group not treated with it. This indicates that Modified Huangqi Guizhi Wuwu Decoction has a positive effect on improving the condition of patients with diabetic peripheral neuropathy. By effectively controlling blood glucose and blood lipids, it can increase nerve conduction velocity, alleviate discomfort symptoms induced by the disease, and ensure treatment effectiveness, warranting further research and discussion. Gong Guangming et al. [17] conducted a meta-analysis showing that, in terms of clinical efficacy and nerve conduction velocity, Huangqi Guizhi Wuwu Decoction combined with mecobalamin for treating DPN has obvious advantages compared to mecobalamin alone. Guo Yongmei et al. [18] used animal experiments to demonstrate that Modified Huangqi Guizhi Wuwu Decoction can inhibit the attack of inflammatory factors on nerve fibers, promote nerve repair, and simultaneously increase the sciatic nerve conduction velocity in rats with diabetic peripheral neuropathy.

3.3 Anti-oxidative Stress

Oxidative stress refers to an imbalance between oxidation and antioxidation in the body. Modern research has found that the occurrence of DPN is closely related to oxidative stress. Accumulation of reactive oxygen species (ROS) leads to axonal damage, causing harm to nerves and thus promoting the progression of DPN.

Experimental studies have confirmed that Huangqi Guizhi Wuwu Decoction protects neural structures through multiple pathways synergistically. Zhang Zhengwei et al. [19] found that Huangqi Guizhi Wuwu Decoction can significantly enhance the expression of intestinal zonula occludens-1 (ZO-1), reduce serum, colon, and dorsal root ganglion endotoxin levels, and effectively alleviate peripheral nerve inflammatory injury. Regarding endoplasmic reticulum stress regulation, Xiao Fan et al. [20] demonstrated that the formula reduces the protein expression of sciatic nerve JNK, p-JNK, and IRE1α, improves the nerve stress state, increases sciatic nerve conduction velocity, and ameliorates nerve injury. In a mouse model induced by 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), baicalein can promote the expression of GSH-Px, maintain intracellular redox balance, maintain the level of the antioxidant GSH in the substantia nigra and striatum, scavenge free radicals, and maintain intracellular environment homeostasis, thereby exerting the antioxidant effects of baicalin and intervening in the treatment of DPN [23].

4. Clinical Research Progress of Huangqi Guizhi Wuwu Decoction in Treating DPN

4.1 Treatment Research Using Simple Formula Modification

Wei Xudong et al. [22] evaluated the effect of Huangqi Guizhi Wuwu Decoction on diabetic peripheral neuropathy by assessing scores on the Neuropathic Pain Scale. They showed that Huangqi Guizhi Wuwu Decoction worked faster in alleviating pathological pain symptoms in DPN patients, with better efficacy compared to oral epalrestat tablets. Huangqi Guizhi Wuwu Decoction can promote the metabolic homeostasis of nerve tissue, effectively relieve neuropathic pain, improve limb motor function, increase nerve conduction velocity, significantly reduce patient symptoms, and ensure patient safety. The pharmacodynamics of Huangqi Guizhi Wuwu Decoction in treating DPN have not only been confirmed in animal and cell experiments but also validated in clinical trials [24]. Huang Yongyue et al. [25] observed indicators such as clinical efficacy, TCM syndrome scores, and nerve conduction velocity, demonstrating that Huangqi Guizhi Wuwu Decoction has a significant effect on treating DPN, accelerating the recovery of nerve conduction function, alleviating symptoms, and being safe and feasible. The above studies all prove that the single formula of Huangqi Guizhi Wuwu Decoction has a certain clinical basis for treating diabetic peripheral neuropathy, expanding the perspectives for its treatment and facilitating its targeted clinical

application. Compared with Western medicines, it can reduce adverse reactions, has higher safety, and is more suitable for long-term treatment of chronic diseases like DPN. In recent years, many studies have shown that Huangqi Guizhi Wuwu Decoction is indeed effective in treating DPN, and it has gradually begun to be applied clinically. The formula treats diseases through many targets, not via a single pathway to improve DPN. The research includes animal and cell experiments as well as clinical trials. Many studies have indicated that Huangqi Guizhi Wuwu Decoction exerts its preventive and therapeutic effects by acting through multiple targets and signaling pathways.

4.2 Combined Chinese and Western Medicine Treatment Research (Combined with Mecobalamin, Epalrestat, etc.)

The etiology and pathogenesis of DPN are complex, and some patients have severe conditions. The efficacy of treatment with mecobalamin alone or with Huangqi Guizhi Wuwu Decoction alone may not be very satisfactory. In clinical practice, the combined application of Huangqi Guizhi Wuwu Decoction is more commonly seen, with more significant efficacy and wider application.

Ye Jianpeng [26] found in his study that the observation group, which received oral administration of modified Huangqi Guizhi Wuwu Decoction in addition to mecobalamin, showed outstanding efficacy. The total effective rate was higher than that of the control group ($P < 0.05$), suggesting that the combination of mecobalamin and modified Huangqi Guizhi Wuwu Decoction can exert a synergistic effect and enhance treatment outcomes. The reason is that mecobalamin facilitates the repair of nerve cells and regulates local metabolism, while the modified Chinese medicine formula helps restore the movement of Qi and blood and regulate the internal environment of the body. Therefore, the two combined have complementary mechanisms: on the one hand, they promote nerve cell repair; on the other hand, they improve neurotrophic supply [27]. The synergistic effect of both helps improve nerve conduction. Bian Yuanyuan et al. [28] found through experiments that combining Modified Huangqi Guizhi Wuwu Decoction with epalrestat tablets produced additive effects in anti-inflammation and antioxidation, enhancing the inhibition of inflammatory factor secretion and regulation of oxygen free radicals, thereby improving efficacy. The combination of Modified Huangqi Guizhi Wuwu Decoction and epalrestat tablets for treating DPN exerts good anti-inflammatory and antioxidant effects, significantly improving patients' nerve conduction function and enhancing clinical efficacy. Pan Kai et al. [29] found through their research that DPN patients treated with a combination of Huangqi Guizhi Wuwu Decoction and mecobalamin achieved good results, increasing antioxidant capacity, accelerating nerve conduction velocity, and promoting disease improvement. In the formula, Astragali Radix (Huangqi) supplements Qi and secures the exterior, greatly tonifying the original Qi; Spatholobi Caulis (Jixueteng) supplements blood and promotes Qi flow; Paeoniae Radix Alba (Baishao) warms the meridians and unblocks stasis; Angelicae Sinensis Radix (Danggui) supplements blood and activates blood; Chuanxiong Rhizoma (Chuanxiong) promotes Qi and activates blood; Cinnamomi Ramulus (Guizhi) promotes Yang transformation of Qi, warms and unblocks the meridians; Carthami Flos (Honghua) activates blood and resolves stasis; Zingiberis Rhizoma Recens (Shengjiang) and Jujubae Fructus (Dazao) enhance the formula's effects of warming meridians, activating blood, and resolving stasis; Glycyrrhizae Radix et Rhizoma (Gancao) harmonizes the various herbs. Simultaneously, Huangqi Guizhi Wuwu Decoction improves blood glucose levels, enhances peripheral nerve conduction velocity, and protects nerve fibers. When combined with the Western medicine mecobalamin, it exerts a synergistic effect, enhancing treatment outcomes, providing a comprehensive therapeutic effect to promote disease improvement, with good safety and patient acceptance. Chen Meiju [30] believes that nerve function is impaired in DPN patients, causing ischemia and hypoxia of nerve fibers, which in turn reduces nerve conduction velocity. Although alpha-lipoic acid can clear free radicals and chelate metal ions such as iron and copper in the body, reducing lactate dehydrogenase formation, thereby increasing the blood flow of neurotrophic blood vessels and improving nerve conduction velocity, modern pharmacological studies show that Zingiberis Rhizoma Recens (Shengjiang) in Huangqi Guizhi Wuwu Decoction can inhibit platelet aggregation, exert antioxidant effects, and inhibit cyclooxygenase, lipoxygenase, and thromboxane β2, thereby regulating blood flow and increasing neurovascular blood flow. Furthermore, Spatholobi Caulis (Jixueteng) in the formula can relieve vascular spasms, dilate blood vessels, and improve blood circulation. This has positive significance for enhancing the antioxidant effects of alpha-lipoic acid. The combined application of both has a greater effect on improving nerve conduction velocity than using a single drug [31].

5. Conclusion

In summary, Huangqi Guizhi Wuwu Decoction has a solid theoretical foundation in TCM, clear pharmacological mechanisms, and confirmed clinical efficacy in treating DPN. At the TCM level, it targets the core pathogenesis of DPN, "Qi deficiency and blood stasis," using the therapeutic methods of supplementing Qi and unblocking stasis, warming the meridians, and harmonizing blood, precisely corresponding to the characteristics of this disease. At the modern pharmacological level, the formula intervenes in the pathological process of DPN through multiple pathways, including regulating inflammatory pathways, promoting nerve repair, reducing oxidative stress and endoplasmic reticulum stress. In clinical application, whether used as a simple modified formula or combined with neurotrophic and antioxidant Western medicines, it effectively improves patients' numbness and pain symptoms, increases nerve conduction velocity, and has fewer adverse reactions, making it more suitable for the long-term management of DPN. As a classic formula commonly used in endocrinology, Huangqi Guizhi Wuwu Decoction provides a reliable option for the integrated treatment of DPN with Chinese and Western medicine.

References

[1] Chang MC, Yang S. Diabetic peripheral neuropathy essentials: a narrative review. Ann Palliat Med. 2023 Mar;12(2):390-398.

[2] Tay JS, Kim YJ. Efficacy of moxibustion in diabetes peripheral neuropathy. Medicine (Baltimore). 2021 Dec 10;100(49):e28173.
[3] Zhu J, Hu Z, Luo Y, Liu Y, Luo W, Du X, Luo Z, Hu J, Peng S. Diabetic peripheral neuropathy: pathogenetic mechanisms and treatment. Front Endocrinol (Lausanne). 2024 Jan 9;14:1265372.
[4] Wang Lexu, Yi Tongning, Qi Yue. Research progress on integrated traditional Chinese and Western medicine treatment of diabetic peripheral neuropathy [J]. Journal of Clinical Chinese Medicine, 2024, 36(12): 2436-2440.
[5] Jia Xiaolei, Zhang Liping. Clinical experience of Liu Tonghua in treating diabetic peripheral neuropathy from the perspective of "Blood deficiency and collateral stasis" [J]. Chinese Folk Therapy, 2025, 33(11): 39-42.
[6] Liu Yanjun, Hu Jinxia, Hu Xiaoling. Current research status of internal Chinese medicine treatment and community comprehensive management of diabetic peripheral neuropathy [J]. Xinjiang Traditional Chinese Medicine, 2025, 43(02): 129-132.
[7] Fang Zhaohui, Wu Yiling, Zhao Jindong. TCM clinical diagnosis and treatment guidelines for diabetic peripheral neuropathy (2016 edition) [J]. Journal of Traditional Chinese Medicine, 2017, 58(07): 625-630.
[8] Wu Jiao, Tong Fangchao. Chemical constituents, pharmacological effects, and clinical application of Astragali Radix [J]. Journal of Binzhou Medical University, 2024, 47(01): 68-75.
[9] Chen Ming, Li Liubing, Zhan Jiahui, et al. Determination of six components in the substance benchmark of Huangqi Guizhi Wuwu Decoction by HPLC [J]. Pharmacy Today, 2023, 33(01): 35-39.
[10] Zhang Yuanyuan, Cai Jiahan, Zhao Chenyang, et al. Research progress on chemical constituents, pharmacological effects, and clinical application of Huangqi Guizhi Wuwu Decoction [J]. Journal of Guangdong Pharmaceutical University, 2025, 41(03): 172-180.
[11] Emerging Risk Factors Collaboration; Kaptoge S, Di Angelantonio E, Lowe G, Pepys MB, Thompson SG, Collins R, Danesh J. C-reactive protein concentration and risk of coronary heart disease, stroke, and mortality: an individual participant meta-analysis. Lancet. 2010 Jan 9;375(9709):132-140.
[12] Jia Yuru, Liu Lei, Ding Yueling. Effects of Huangqi Guizhi Wuwu Decoction on miR-146a and MyD88/IκB signaling pathway in patients with diabetic peripheral neuropathy [J/OL]. Chinese Archives of Traditional Chinese Medicine, 1-11 [2025-06-22]. http://kns.cnki.net/kcms/detail/21.1546.R.20241012.1105.010.html.
[13] Yin Danfeng. Observation on the efficacy of Huangqi Guizhi Wuwu Decoction combined with epalrestat in treating diabetic peripheral neuropathy [J]. Chinese Medical Journal of Metallurgical Industry, 2024, 41(04): 380-381.
[14] Zhou Wen, Fang Ying, Chu Quangen, et al. Effects of Huangqi Guizhi Wuwu Decoction on serum IL-1β, TNF-α, NGF and sciatic nerve NGF mRNA in rats with diabetic peripheral neuropathy [J]. Journal of Anhui University of Chinese Medicine, 2020, 39(03): 67-71.
[15] Wei Wenjing, Chen Qiu. Research overview of Huangqi Guizhi Wuwu Decoction in treating diabetic peripheral neuropathy [J]. Journal of Guangxi University of Chinese Medicine, 2020, 23(03): 73-75.
[16] Lin Yunmei, Liang Qiong, Luo Chunyan. Pharmaceutical analysis of Modified Huangqi Guizhi Wuwu Decoction in treating diabetic peripheral neuropathy [J]. Diabetes New World, 2022, 25(06): 187-190.
[17] Gong Guangming, Zhang Yuan, Li Meiling, et al. Meta-analysis of Huangqi Guizhi Wuwu Decoction in treating diabetic peripheral neuropathy [J]. Henan Traditional Chinese Medicine, 2020, 40(11): 1656-1661.
[18] Crook S J, McTernan P G, Kusminski C M, et al. Lipopolysaccharide activates an innate immune system response in human adipose tissue in obesity and Type 2 diabetes [J]. Am J Physiol Endocrinol Metab, 2007, 292(3): 740-774.
[19] Zhang Z, Ye J, Liu X, et al. Huangqi Guizhi Wuwu decoction alleviates oxaliplatin-induced peripheral neuropathy via the gut-peripheral nerve axis [J]. Chinese medicine, 2023, 18(1): 1-114.
[20] Xiao F, Zhou C, Cao M, et al. Effect of Huangqi Guizhi Wuwu Decoction on diabetes in MKR mice by regulating endoplasmic reticulum stress [J]. Chinese Journal of Experimental Traditional Medical Formulae, 2022, 28(16): 1-8.
[21] Fan Shizhen, Zhao Zhigang. Progress in drug treatment of diabetic peripheral neuropathy complications [J]. Drug Evaluation, 2013(17): 18-22.
[22] Wei Xudong, Xie Haiyan, Wei Xuan, et al. Observation on the analgesic effect of Huangqi Guizhi Wuwu Decoction on diabetic peripheral neuropathy pain [J]. Tianjin Traditional Chinese Medicine, 2026, 43(03): 304-311.
[23] Jiang Xihong, Liu Shumin. Study on the pharmacological effects and chemical material basis of Scutellariae Radix [J]. China Pharmacist, 2020, 23(10): 2004.
[24] Han Xinyuan, Liu Changqing, Sun Chenxi, et al. Research progress on the mechanism of Huangqi Guizhi Wuwu Decoction in treating diabetic peripheral neuropathy [J]. China Journal of Chinese Materia Medica, 2025, 50(20): 5632-5640.
[25] Huang Yongyue, Liang Miaohong. Efficacy of Huangqi Guizhi Wuwu Decoction in treating diabetic peripheral neuropathy with Qi deficiency and blood stasis syndrome and its effect on TCM syndromes in patients [J]. Inner Mongolia Traditional Chinese Medicine, 2025, 44(07): 62-63.
[26] Ye Jianpeng. Efficacy and safety analysis of modified Huangqi Guizhi Wuwu Decoction combined with mecobalamin in patients with diabetic peripheral neuropathy [J]. Diabetes New World, 2025, 28(13): 185-189.
[27] Liu Manman, Feng Zhenfeng, Jiang Jian, et al. Dose-effect relationship of different doses of Huangqi Guizhi Wuwu Decoction in treating diabetic peripheral neuropathy and its effect on the classical Wnt signaling pathway [J]. Modern Journal of Integrated Traditional Chinese and Western Medicine, 2022, 31(14): 1922-1927, 1933.
[28] Bian Yuanyuan, Sun Yongzhi, Cao Yixuan, et al. Clinical observation of Huangqi Guizhi Wuwu Decoction combined with epalrestat tablets in treating

diabetic peripheral neuropathy [J]. Chinese Medicine Modern Distance Education of China, 2023, 21(20): 135-138.
[29] Pan Kai, Yang Qi. Clinical observation of Huangqi Guizhi Wuwu Decoction combined with mecobalamin in treating diabetic peripheral neuropathy [J]. Chinese Medicine Modern Distance Education of China, 2024, 22(13): 143-146.
[30] Chen Meiju. Clinical effect of Huangqi Guizhi Wuwu Decoction combined with alpha-lipoic acid in treating diabetic peripheral neuropathy [J]. Clinical Medical Research and Practice, 2023, 8(19): 132-135.
[31] Qin Hongyu, Deng Yihui. Observation on the efficacy of Huangqi Guizhi Wuwu Decoction combined with mecobalamin in treating type 2 diabetes patients with lower limb peripheral neuropathy [J]. Yunnan Journal of Traditional Chinese Medicine and Materia Medica, 2020, 41(6): 14-17.