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Clinical Application and Dosage Study of Rhizoma Polygonati Odorati in the Treatment of Dryness Syndrome

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Abstract: Objective: To sort out the ancient records, classic formula applications, and modern medical experience of Polygonatum sibiricum, summarize its efficacy characteristics, clinical dosage, and compatibility rules, and provide a reference for the rational clinical application of Polygonatum sibiricum. Method: This study systematically reviewed records from ancient medical classics, applications of classical famous prescriptions and clinical experience of modern physicians, and summarized the core efficacies of Rhizoma Polygonati Odorati: nourishing Yin to moisten dryness and promoting fluid production to quench thirst. Results: With mild medicinal properties, this herb nourishes Yin without retaining pathogenic factors and moistens dryness without stagnating the spleen-stomach Qi movement. The standard clinical dosages are sorted out as follows: 6–30 g for decoction, among which 6–10 g is applied for mild conditions, and 15–30 g for diabetes mellitus and severe Yin deficiency; the dosage of pills and powders is 1.5–3 g. Doses are refined by therapeutic effects: 6–15 g for nourishing Yin and moistening the lung, 10–30 g for promoting fluid production to quench thirst, and 10–20 g for nourishing Yin to calm the heart. Its compatibility rules are also concluded: it is often combined with Radix Ophiopogonis, Radix Glehniae and Folium Mori to moisten the lung; matched with Radix Trichosanthis, Radix Rehmanniae Recens and Radix Ophiopogonis to relieve thirst; and paired with Radix et Rhizoma Salviae Miltiorrhizae, Semen Ziziphi Spinosae and Semen Platycladi to nourish the heart. Conclusion: This study provides a reference for precise clinical dosage and rational compatibility of Rhizoma Polygonati Odorati, and supports its safe and effective application in lung-stomach Yin deficiency, xiao-ke (wasting-thirst syndrome), Yin deficiency exterior syndrome, palpitations, insomnia, and other disorders.

Keywords: Rhizoma Polygonati Odorati; Dryness syndrome; Dose-effect research; Clinical dosage; Compatibility rules; Yin-nourishing and dryness-moistening therapy

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1. Origin of medicinal herbs and their properties, flavors, and efficacy (%)

Polygonatum odoratum, also known as tail ginseng, ground pipe, bell-shaped vegetable, and magnolia, is a perennial herbaceous plant in the Polygonatum genus of the Asparagaceae family [1]. Yuzhu is a medicinal and edible plant. According to the Chinese Pharmacopeia, it has a sweet taste, a slightly cold nature, and belongs to the lung and stomach meridians. It mainly contains components such as polysaccharides from Polygonatum sibiricum, steroidal saponins, flavonoids, and volatile oils [2-3]. The core functions are nourishing Yin and moistening dryness, generating fluids and quenching thirst, nourishing Yin without aiding dampness, supplementing deficiency without falling in love with evil, and it is a commonly used calming product for lung-stomach Yin deficiency syndrome [4-5]. Used for lung and stomach Yin injury, dry heat cough, dry throat and mouth, internal heat quenching, etc. The pharmacopeia stipulates that the dosage range of Polygonatum sibiricum is 6-12 g, with a daily dose [6]. This article combines the clinical experience of ancient books and modern medical practitioners on the application of jade bamboo to discuss the appropriate dosage and compatibility rules of jade bamboo in clinical practice, providing a reference for the clinical use of jade bamboo.

2. Classic formula dosage and compatibility

In ancient times, doctors used jade and bamboo in combination with different traditional Chinese medicines to treat diseases such as colds, coughs, and moths. The dosage varied between ancient and modern times, such as about 13.8 g per liang in the Eastern Han Dynasty, 41.4 g per liang in the Song, Jin, and Yuan Dynasties, 37 g per liang in the Ming Dynasty, and 37.3 g per liang in the Qing Dynasty [7]. Yuzhu recorded its efficacy under the name of “Nüwei” in the “Shennong Bencao Jing” [8]. The prescription first appeared in the Tang Dynasty’s Sun Simiao’s “Essential Prescriptions for Preparing Urgent Qianjin” called “Weirui Tang”. Composition: Two pairs each of Weirui (Yuzhu), Baiwei, Duhuo, Almond, Chuanxiong, Licorice, Qingmu Xiang, and Ephedra; Three liang of gypsum. The main treatment for wind- and temperature-related diseases has established the core usage of Yuzhu in nourishing Yin, clearing heat, and relieving external wind, laying a certain foundation for the theory of “Yin deficiency and external sensation” in later generations. Wurui Tang (Treatise on the Total Diseases of Cold Damage, Song Dynasty, Pang Anshi) is made of one or two pieces of jade and bamboo, combined with Bai Wei, Ma Huang, Du Huo, Da Almond, Xiong Yan, Licorice, Qingmu Xiang, Ge Gen, Gypsum and other herbs to nourish Qi and Yin, promote Yang and dispel fire; Modified Wei Rui Tang (Revised Popular Treatise on Cold Damage) is made with three pieces of jade and bamboo, combined with Bai Wei, mint, fermented black beans, and Campanula grandiflorum. It nourishes Yin and relieves external heat, and is mainly used for treating Yin deficiency, external wind and heat, headache, body heat, cough, dry throat, lack of sweat or sweating. Yiwei Tang (Wen Bing Tiao Bian) is made of jade and bamboo for 1.5 cents, combined with sand ginseng, Ophiopogon japonicus, and Rehmannia glutinosa. It is mainly used for treating stomach Yin deficiency, dry mouth and throat, and loss of appetite. Zhumaidong Tang (Wen Bing Tiao Bian) is made of jade and bamboo, combined with Ophiopogon japonicus and sand ginseng. It nourishes Yin and moistens the lungs, and is mainly used to treat dryness and damage to the lungs, stomach Yin, and dry cough with less phlegm. Weirui Wan (Shengji Zonglu) is a Yuzhu-made pill, combined with Ophiopogon japonicus and Lily, which can nourish Yin and moisten the lungs when taken for a long time. It is used for chronic cough caused by deficiency and fatigue. Sha Shen Mai Dong Tang (“Wen

Bing Tiao Bian") is made of two taels of jade and bamboo, combined with Sha Shen, Mai Dong, Tian Fen, Hu Lang, mulberry leaves, and licorice. It indicates dryness and injury in the lungs and stomach. Symptoms include dry throat and mouth, dry cough with less phlegm, hot flashes, and red tongue with less coating. Runzao Xiefei Tang (Yi Chun Cong Yi, Qing Dynasty, Fei Boxiong) contains four taels of jade and bamboo, combined with Gualou skin, Mulberry skin, Sand ginseng, Ophiopogon japonicus, Scutellaria baicalensis, Fritillaria cocos, Almonds, and Turmeric. Used to nourish Yin and reduce fire, moisten dryness and relieve lung inflammation. From this, it can be seen that during the Han Dynasty, Yuzhu was mainly used for treating internal storm heat and various deficiencies (as stated in the "Shennong Bencao Jing"), as well as external infections and deficiencies. During the Tang and Song dynasties, it was expanded to include nourishing Yin, nourishing appearance, and treating wind and heat. During the Ming and Qing dynasties, it was widely used for lung and stomach Yin deficiency, dry cough, quenching thirst, and external Yin deficiency.

3. Four experienced traditional Chinese medicine practitioners have experience in dosage and compatibility

3.1. Yu Jingmao

Yu Jingmao believes that the deficiency of lung Yin and the damage of dry pathogens to the lungs can lead to dry cough, lack of phlegm, dry sore throat, and hoarseness, which are often caused by the internal generation of lung Yin deficiency and heat deficiency. The treatment is to nourish Yin and moisten the lungs, relieve cough and benefit the throat. Jade bamboo is commonly used to nourish lung Yin, moisten dryness and relieve cough, and is combined with Ophiopogon japonicus, almonds, and mulberry leaves to clear lung dryness, reduce phlegm and benefit the throat. The dosage of jade bamboo is 10-15g. When treating dry mouth and throat caused by gastric Yin deficiency and lack of fluid retention, thirst induced by thirst, and poor appetite, jade bamboo is often used to nourish the stomach and generate fluids, nourish Yin and quench thirst, and combined with dendrobium and pollen to enhance the power of nourishing Yin, clearing heat, generating fluids and quenching thirst. The dosage of jade bamboo is 5g [9].

3.2. Shen Shuwen

Shen Shuwen believes that in the late stage of exogenous febrile diseases, those with Yin deficiency and residual heat that have not been cleared, the pathogenesis is mostly due to the gradual retreat of pathogenic heat and the injury of Yin and body fluids. The treatment should be mild and nourishing Yin, supporting the body and eliminating evil, and commonly using 10-15g of jade bamboo to nourish Yin, moisten dryness, and generate body fluids. Its nature is sweet and gentle, nourishing Yin without hindering evil, supporting the body without leaving evil, and not affecting the external transmission of residual evil. It is suitable for the adjustment and care of the late stage of exogenous infections [10].

3.3. Xu Minhua

Xu Minhua believes that chronic diseases such as body deficiency, Qi and Yin deficiency leading to insufficient appetite, fatigue, dry mouth, and shortness of breath are often caused by prolonged disease course and Qi and Yin depletion. The treatment is to nourish Qi and Yin, strengthen the spleen and promote movement. 12-15g of Yuzhu is commonly used to nourish Yin and moisten dryness, nourish Qi and produce fluids, and combined with Taizishen, Shashen, and Ophiopogon japonicus to achieve the dual tonifYing

effect of Qi and Yin. It can nourish Yin without being greasy or stagnant, replenish Qi without being blocked, and is suitable for the treatment of chronic diseases with body deficiency [11].

3.4. Lv Renhe

Lv Renhe believed that the pathogenesis of the first syndrome of diabetes (diabetes) was mainly due to excessive dryness and heat and the deficiency of Yin and fluid, especially the deficiency of Yin in the lung and stomach. Covering the lungs is the source of water above, and the stomach is the sea of water and grains. If the lungs are hot and the body is injured, it can cause restlessness, thirst, excessive drinking, and a dry throat and tongue. If the stomach Yin is insufficient, it can relieve hunger, dry mouth and constipation. Over time, the Yin fluid will be more depleted, and the dryness and heat will become more intense, leading to quenching thirst. Therefore, the treatment should focus on nourishing Yin, moistening dryness, generating fluids, and quenching thirst. The key is to nourish the lungs and stomach, clear and eliminate dryness and heat, while also taking care of Yin and fluids and stabilizing blood sugar. In clinical practice, 15-30 g of Polygonatum sibiricum is commonly used. It is a sweet and smooth substance that enters the lungs and stomach meridians. It is good at nourishing Yin, moistening dryness, generating fluids, and quenching thirst. It can be replenished without being blocked or greasy, and can nourish lung Yin to moisten lung dryness and stomach Yin to relieve irritability and thirst. It is an excellent product for treating lung stomach Yin deficiency and quenching thirst. Compatible with Rehmannia glutinosa, nourishing Yin and cooling blood, nourishing Yin and generating fluids, clearing and eliminating lung and stomach deficiency heat; Ophiopogon japonicus nourishes Yin and moistens the lungs, benefits the stomach and generates fluids, and enhances the moisturizing power of Polygonatum sibiricum; Tianhua powder is known for clearing heat, purging fire, generating fluids, and quenching thirst. It is specifically designed to relieve dryness and heat in the lungs and stomach, quench thirst, and relieve irritability. The combination of the four drugs can nourish the lung and stomach, nourish Yin and dryness, and promote production of fluid and quench thirst. It is especially suitable for those with diabetes due to the deficiency of lung and stomach Yin. It can effectively improve dry mouth, eliminate grain and hunger, irritate heat and dry throat, and has the effect of assisting in lowering blood sugar and stabilizing blood sugar [12].

4. Expert dosage and compatibility of the 4-way drug efficacy research committee

4.1. Tong Xiaolin

Academician Tong Xiaolin divided type 2 diabetes into four states: “depression”, “heat”, “deficiency,” and “impairment” [13-14]. “Yin deficiency and dryness and heat” is the key stage proposed in the core pathogenesis theory of type 2 diabetes. This stage is mainly due to improper diet, emotional disorder, and insufficient endowment, which leads to the dark consumption of Yin and endogenous dryness and heat. The main pathogenesis is the depletion of lung, stomach, kidney Yin, and the burning of fluid due to deficiency of fire. The clinical manifestations are characterized by dry mouth and throat, excessive thirst, frequent urination, thin body, and red tongue with less fluid. The treatment focuses on nourishing Yin and moistening dryness, generating fluids to quench thirst, and caring for Yin fluids. The key is to nourish Yin and fluids to control dryness and heat, and restore the metabolism of body fluids. Therefore, the prescriptions for nourishing Yin and promoting fluids, clearing heat, and moistening dryness are the core drugs for the treatment of type 2

diabetes in the stage of Yin deficiency and dryness. The method of nourishing Yin and generating fluids can be achieved by using jade bamboo to nourish the lung, stomach, and kidney Yin, moisten dryness, and quench thirst. It can be combined with black ginseng, Ophiopogon japonicus, and kudzu root to nourish Yin, clear heat, generate fluids, and improve thirst. The dosage of jade bamboo is 15-30 g [15-16].

4.2. Xu Guoliang

Xu Guoliang believes that hypertension and coronary heart disease have a long course of disease, which can easily lead to the depletion of Yin fluid and stagnation of the heart and blood vessels. Clinically, common symptoms include Yin deficiency, dry mouth, chest tightness, dull pain, palpitations, and shortness of breath. The main pathogenesis is Yin deficiency, fluid deficiency, and blood stasis in the heart and blood vessels. Treatment should focus on nourishing Yin and generating fluids, promoting blood circulation and unblocking meridians, and protecting the heart and blood vessels. Commonly used is 10-15 grams of Yuzhu, which nourishes Yin, moistens dryness, and protects the heart and meridians. It is combined with Ge Gen Sheng Qing Tong Mai, Dan Shen Xue Xue Xue Xing Yu, and Mai Dong Yang Yin Qing Xin to nourish Yin and protect the heart, promote blood circulation and unblock meridians, and relieve symptoms such as Yin Jin, blood stasis, chest tightness, and dry mouth [17].

5. Modern medical clinical compatibility applications

5.1. Ophiopogon japonicus, sand ginseng, mulberry leaves: Nourish Yin and moisten the lungs, treat lung Yin deficiency and dry cough, Yuzhu 6-15g

Li Jiren, a master of traditional Chinese medicine, is used to treat lung Yin deficiency and dry cough caused by external pathogenic factors, prolonged illness that depletes Yin, and elderly Yin deficiency. Symptoms include dry cough with no or little phlegm, sore throat, hoarse voice, difficulty with phlegm viscosity, and, in the late stage of fever, when lung fluid has not recovered, long-term coughing harms Yin, resulting in dryness and excess fluid deficiency. Yuzhu is often used or combined with medication, and after taking the medicine, the lungs become moist and the cough slows down. When encountering the syndrome of lung Yin deficiency and dry cough, Yuzhu is used to nourish Yin and produce fluids, moisten the lungs and relieve cough. It is combined with Ophiopogon japonicus, sand ginseng, mulberry leaves to nourish Yin and moisten the lungs, clear and promote dryness and heat. The combined use of various medicines works together to nourish Yin and moisten the lungs. The dosage of Yuzhu is 6-15g [18].

5.2. Matian pollen, Rehmannia glutinosa, Ophiopogon japonicus: Produce fluid and quench thirst, treat stomach Yin deficiency and diabetes, 10–30 g of Polygonatum odoratum

Nan Zheng, a Master of Traditional Chinese Medicine treated the stage of stomach Yin deficiency and heat deficiency in diabetes. The symptoms include dry mouth and tongue, excessive thirst, good appetite for grains, red tongue and lack of body fluids, and a fine pulse. These symptoms are often caused by long-term dietary disorders and emotional changes, leading to gastric Yin depletion, internal heat deficiency, and inability to transfer body fluids [19]. The treatment should nourish the stomach Yin, clear heat and produce fluids, quench thirst and relieve irritability. Commonly used is 10-30 g of Yuzhu [20], which is sweet, cold, nourishing Yin, and beneficial to the stomach and body fluids. It is combined with Tianhua powder to clear

heat, eliminate fire, and quench thirst. It also produces Rehmannia glutinosa, cools blood, nourishes Yin, and increases fluids. Ophiopogon japonicus moistens the lungs, benefits the stomach, and produces fluids to clear the heart. When combined with various medicines, it has the effects of generating fluids, quenching thirst, nourishing Yin, and clearing the stomach, restoring stomach Yin and reducing deficiency fire. This can eliminate symptoms such as dry mouth, frequent drinking, and easy hunger.

5.3 Paired with Danshen, Suanzaoren, and Baiziren: Nourishing Yin and Nourishing Heart, Treating Yin Deficiency, Insomnia, and Palpitation, Yuzhu 10-20 g

Zhang Boli, a master of traditional Chinese medicine, treats insomnia, palpitations, restlessness, forgetfulness, frequent dreams, dry mouth and throat caused by Yin deficiency and lack of blood, as well as loss of mental and spiritual nourishment. This is often due to long-term illness, physical weakness, fatigue, internal injury, and dark depletion of Yin blood, resulting in insufficient Yin in the heart and internal disturbance of deficiency fire. The treatment should focus on nourishing Yin and blood, calming the heart and calming the mind. Commonly used is 10-20 g of Yuzhu, which nourishes Yin, moistens dryness, and nourishes the heart and Yin. It is combined with Danshen to promote blood circulation, clear the heart, and relieve restlessness. Suanzaoren and Baiziren are used to nourish the heart and Yin, calm the mind, and relieve palpitations. When combined with various medicines, it has the effect of nourishing Yin and nourishing the heart, calming the mind and relieving palpitations, ensuring sufficient Yin fluid and peace of mind. This can relieve insomnia and palpitations [21].

5.4. Paired with Astragalus membranaceus, Hedyotis diffusa, Ganoderma lucidum, and Scutellaria barbata

Professor Shan Zhaowei self-formulated Qizhu Formula with modifications to treat postoperative Qi and Yin deficiency in gastric cancer. Symptoms include decreased appetite, postprandial bloating, dry mouth and thirst, pale complexion, poor mental state, fatigue, emaciation, restless heart, red tongue with little coating, and fine pulse count. Professor Shan Zhaowei found in clinical practice that postoperative patients with gastric cancer, especially after radiotherapy and chemotherapy, often suffer from significant damage to Qi and blood, indicating a deficiency of both Qi and Yin [22]. Treatment should focus on nourishing Yin and Qi, supporting the body and fighting cancer. Commonly used is 15g of jade bamboo, which can nourish Yin and clear heat. Using HuangQi and Yuzhu to imitate Zhang Xichun, the combination of HuangQi and Zhimu symbolizes the use of two medicines: one Yin and one Yang, one warm and one cold. They should be used in conjunction with each other: sweet, warm, and nourishing Qi; cool, and nourishing Yin [23].

5.5. Prepare epimedium and aconitum

The “Compendium of Materia Medica Annotations” records that Polygonatum sibiricum can regulate “Qi accumulation in the heart and abdomen, deficiency of heat, dampness and toxicity”, indicating that Polygonatum sibiricum can improve cardiovascular and pulmonary function. Master Lei Zhongyi of Traditional Chinese Medicine often uses this herbal medicine to treat heart failure with Yang Qi deficiency syndrome, which can cause symptoms such as chest tightness, wheezing, palpitations, coughing, thin and white sputum, cold limbs, chills, oliguria, edema, spontaneous sweating, and sweating with dampness and coldness. Yuzhu nourishes Yin, Fuzi returns Yang, Epimedium tonifies the kidney and helps Yang, and can also dispel rheumatism. The three are matched, with a combination of Yin and Yang. Seeking Yang in Yin

leads to the harmony of Yin and Yang in the heart, and the disease tends to heal. The commonly used dosage is 10-15g [24].

5.6. Goji berries, raw earth, and peony bark

Professor Sun He believes that most patients with dry eyes have liver and kidney Yin deficiency. Bitter-tasting drugs should be used to relieve fire and preserve Yin; bitter and cold to clear heat and reduce fire and preserve Yin; sweet and cold to nourish Yin; and sweet and warm to nourish and protect the stomach. Overall, nourishing Yin and reducing fire are the main methods. The "core medicine" focuses on nourishing Yin and clearing heat [25], so it is commonly used to treat dry eye syndrome by combining jade bamboo with wolfberry, raw earth, and peony bark.

6. Conclusion

By sorting out the classic famous prescriptions, famous old Chinese doctors, experts of the "Prescription Dose Effect Research Committee," and modern physicians' experience in clinical application of polygonatum odoratum and its dosage, it is concluded that the clinical dosage of polygonatum odoratum is 6–30 g for decoction, 6–10 g for mild diseases, 15–30 g for diabetes, and 15–30 g for severe Yin deficiency, and 1.5–3 g for pills, which is suitable for long-term Yin nourishing and conditioning. For external use: appropriate amount, 15–30 g, decoct and wash with water. Jade bamboo should be fried for a long time to facilitate the precipitation of polysaccharides and other components. Use with caution in patients with spleen deficiency, excessive phlegm and dampness, and loose stools [26]. Modern pharmacological research has confirmed that Polygonatum sibiricum has mild and extensive pharmacological effects, with core manifestations in lowering blood sugar and lipids, antioxidant activity, immune regulation, and protecting cardiovascular health. It is a commonly used medicine for regulating Yin deficiency constitution and assisting in the treatment of various chronic diseases [27]. In terms of reducing blood sugar, Polygonatum odoratum contains polysaccharides, steroidal saponins, and other components, which can regulate insulin sensitivity, improve sugar metabolism, and assist in controlling blood sugar, and is suitable for diabetes with Yin deficiency and dryness heat [28]. In terms of lipid reduction, Polygonatum odoratum can improve lipid metabolism, reduce serum harmful lipids, increase beneficial lipids, and reduce the risk of coronary atherosclerosis. In terms of antioxidant properties, its active ingredients can eliminate free radicals, reduce oxidative damage, and alleviate common discomfort in Yin deficiency constitution. In terms of immune regulation, Yuzhu can bidirectionally regulate the body's immune system, enhance immune function, and is suitable for people with body deficiency and postpartum fluid deficiency. In terms of protecting the cardiovascular system, Yuzhu can dilate coronary arteries, improve myocardial blood supply, and assist in alleviating symptoms of cardiovascular disease accompanied by Yin deficiency. Yuzhu is safe for clinical use with minimal side effects. Only patients with spleen and stomach deficiency and cold may experience mild discomfort, which can be relieved by discontinuing the medication. Its pharmacological effects are consistent with traditional Yin nourishing effects, providing reference for rational clinical drug use [29-30].

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