***Prevention and treatment of gastric Helicobacter pylori infection based on the traditional Chinese medicine theory of treating future disease***

**Abstract**:

This work aims to discuss the understanding of Helicobacter pylori (HP) in Chinese medicine and the timeframe when the theory of ‘treating the future disease’ in Chinese medicine fits in with the prevention and treatment of HP infection. HP is a pathogen with a high infection rate worldwide, and its infection route is mainly oral-oral transmission, which is the most important controllable risk factor for gastric cancer, and is recognised by the World Health Organisation as a class I carcinogen. Prevention and eradication of HP infection is a global public health concern. The Study also discussed the prevention and treatment methods and strategies of HP infection from the family and medical levels, so as to provide reference data for the development of public health policies and clinical practice. This study will provide valuable data for informing public health policy and guiding clinical practice.

**Keywords:** Helicobacter pylori; gastric disease; prevention and treatment, Chinese and western medicine

**Introduction**

Helicobacter pylori (Hp) is the chief etiologic agent involved in gastric diseases in humans with worldwide distributions [35]. It is a Gram-negative spiral-shaped bacterium that is mainly transmitted from person to person via the oral-oral route. After invading the human body through the oral cavity, HP specifically colonises the epithelial tissue of the gastric mucosa, and it is difficult to be eliminated spontaneously by human immunity, which leads to lifelong infections if left untreated[1-2]. HP is closely associated with chronic gastritis, peptic ulcer, gastric cancer, and gastric-associated lymphoid malignant lymphoma [3]. It is also closely associated with cardiovascular and cerebrovascular diseases, metabolic syndrome, neurological and gynaecological diseases, and has multiple pathogenicity. In 1994, the World Health Organization (WHO) designated it as a class I carcinogen, and in 2014, the Kyoto Global Consensus on Helicobacter pylori Gastritis explicitly defined HP gastritis as an infectious disease. Currently, the global prevalence of HP infection is greater than 50%, and even up to 84% in some areas of China [4]. One of the main strategies to overcome drug resistance is to develop new treatment plans. Traditional Chinese medicine (TCM) that is commonly used to treat many diseases in China can reduce drug resistance and increase the eradication rate of H. pylori [36]. Eradication of HP infection can significantly reduce the incidence of gastric cancer. Western medical treatment mainly adopts the ‘triple’ or ‘quadruple’ therapy of antibiotics combined with proton pump inhibitors (PPIs), but with the popularity of this treatment regimen, the problems of high drug resistance rate, frequent adverse events, and high recurrence rate are becoming more and more prominent, and they have become the main reasons for the failure of HP eradication [5]. In 2017, HP was listed as one of the ‘12 most dangerous drug-resistant bacteria’ by WHO, becoming a global public health problem [6]. The eradication of HP can effectively reduce the incidence of gastric cancer and mortality [7].

There is no name for HP infection in TCM, but the symptoms caused by HP infection can be classified as ‘gastric plaque’ and ‘gastric epigastric pain’ in TCM. In recent years, many studies have shown that Chinese medicine has significant therapeutic efficacy, non-resistance, small adverse reactions and other characteristic advantages[8]. The Yellow Emperor's Classic of Internal Medicine says that ‘when the righteousness exists within, the evil cannot be dried up’, and HP infection has the characteristics of a long incubation period, invisibility, and ease to recur, and the characteristic of TCM's ‘treating the future disease’ is ‘preventing the disease before it occurs, preventing the change of the disease, and preventing the recurrence of the disease’, which makes it possible to prevent HP infection from recurring. ‘It provides a feasible idea for the prevention and treatment of HP infection.

**1. Routes of transmission of HP infection[9]**

**1.1 Oral-oral transmission:**

Oral-oral transmission is the main transmission route. Family members share utensils, cups of water, or kissing, and transmission occurs through saliva alternation, and an important route of infection in infants and young children is chewing and feeding by family members [10]. National multicentre studies have shown that families that use communal chopsticks or spoons have a reduced risk of HP infection in their members [11]。

**1.2 Faecal-oral transmission**

Poor hygiene practices such as not washing hands before and after meals and not cleaning up after contact with contaminants increase the risk of HP infection.HP is excreted in the faeces of infected persons and may be contracted by others when ingested if it contaminates water sources, vegetables, or food (e.g., raw food, unwashed fruits and vegetables).

**1.3 Gastro-oral transmission**

Gastro-oral transmission is mostly a medical infection, e.g., gastroscopy and dental instruments are not sterilised thoroughly, and contamination of medical devices may lead to cross-infection [30].

**2. Chinese medicine's understanding of HP infection**

HP has the unique ability to survive in the acidic environment of the stomach, and the common clinical symptoms of HP infection are pain or discomfort in the upper abdomen, bloating, belching, acid reflux, heartburn, loss of appetite, and bad breath. In Chinese medicine, there is no corresponding name for the disease, but according to its symptoms, it belongs to the category of ‘stomach pain’, ‘stomach rumbling’, ‘eructation’, ‘noisy’, etc. The disease is located in the stomach, which is related to the spleen and the spleen. HP infection belongs to the category of external evils, and Chinese medicine believes that dampness and heat produce worms, and HP is the invisible worm of external evils [12]. Medicine - insect evidence’ said: “All these insects, attached to the stomach and intestines, if the vitality is still solid, not a great harm; a little deficiency, then can erode, with its insect movement and change the disease”. The Treatise on the Spleen and Stomach points out that ‘internal injury to the spleen and stomach, all diseases are born’. When the normal function of the spleen and stomach, is better than the evil, the can be dispelled out of the evil, the body has no obvious symptoms, and the spleen and stomach are a little deficient, unable to drive the evil out of the body, the symptoms since the emergence. Liu Binbin et al [13] found that in 244 cases of chronic non-atrophic gastritis HP infection, the proportion of spleen and stomach damp-heat evidence is the highest, 43%, followed by liver and stomach disharmony evidence, spleen and stomach weakness evidence. Many medical doctors have similar experiences that the internal cause of HP-related gastritis is the weakness of the spleen and stomach, and the external cause is the feeling of evils and poisons, resulting in dampness and turbidity obstruction and heat and toxicity [14-15]. Traditional Chinese medicine treatment of HP infection is based on supporting the correctness, clearing heat and eliminating dampness [16]. Zhang Shengsheng [17] believes that the diagnosis and treatment should be carried out in phases, and the treatment of HP gastritis should be detoxified and unimpeded in the early stage, and in the late stage, the cold and heat should be adjusted.

**3. Chinese medicine's ‘cure the future disease’ theory and the prevention and treatment of HP infections fit the period of time**

**3.1 Preventing disease and preventing its development**

When the human body shows signs and symptoms of health imbalance, it should be adjusted in time to prevent illness. This state of ‘wanting to be sick before being sick’ is also known as the ‘pre-disease state’. In ‘Su Wen - The Eight Corrections of Divine Brightness’, ‘early curbing of its path’ means that there is an aura or a budding state, which corresponds to the early stage of the disease when the intervention is most effective and prevents it from developing into a disease. It is now clear that the main causative factor of HP is external evil, combined with modern medical research also believes that HP is an external evil attack, ‘where the evil is, its gas must be weak’, the human body's spleen and stomach weak opportunity, HP to take advantage of the weakness of the invasion of the human body, so it is necessary to want to save the disease bud, preventing and preventing the gradual. The specific measures are mainly to eliminate the cause of disease and appropriate intervention, which confirms the importance of the concept of ‘treating the disease before it is diagnosed’ in the treatment of HP in Chinese medicine [31].

**3.2 Early diagnosis and treatment of existing diseases and prevention of their transmission**

Both disease prevention emphasises the early diagnosis and treatment of disease to interrupt the progress, in order to prevent further development of the disease, ‘Su Wen - yin and yang should be like the theory’ pointed out that ‘the arrival of the evil wind, as fast as the wind and rain, so the good treatment of the skin, followed by the skin, followed by the sinews and veins, followed by the treatment of the six bowels, followed by the treatment of the five viscera. Treatment of the five viscera, half dead and half alive,’ suggests that the treatment needs to grasp the disease from the surface into the shallow into the depth of the law of transmission, deep invasion of the five viscera is a poor prognosis [32]. HP infection of the core mechanism of dampness and heat is hidden, the pivot is not conducive to the yin and yang two injuries. Dampness and heat obstruct the middle jiao, causing congestion of the qi, the spleen loses its ability to rise and clear, the stomach loses its ability to lower the turbidity, and the pivot mechanism is out of order. Dampness is a yin evil that injures yang, heat is a yang evil that depletes yin, and over time both yin and yang are damaged. Dampness and heat are embedded in the middle Jiao, stagnant gas and water, resulting in phlegm and dampness, forming a mixed picture of deficiency and reality. Physical factors determine the return of the disease mechanism: Yangming's physique is hot, and damp-heat evidence is heavier than dampness, which is easy to transform from heat to dryness; Taiyin's physique is weak in the spleen, and dampness is heavier than heat, which is more likely to be transformed into dampness and cold, which confirms Xue Shengbai's thesis in the ‘Articles on Warm Diseases’, that ‘middle-qi solid disease is found in the Yangming, and middle-qi deficient disease is found in the Taiyin’[33].

The root cause of cancer in patients with HP infection is the deficiency of positive qi, the residual toxicity is not exhausted, and the ambiguous evils are injected into the internal organs and meridians. According to Chinese medicine, the tumour belongs to the category of ‘accumulation of mass in the abdomen’, and ‘The Spiritual Pivot - The Beginning of All Diseases’ believes that ‘the tumour will not be retained, and will become an accumulation of interest’. Therefore, for patients with HP infection, we should help them to get rid of the evil at the stage of the existing disease, treat the disease reversal, and prevent the disease from spreading.

**3.3 Regulate after disease and prevent its recurrence**

When the disease is first cured, the qi and blood are not strong, the positive qi is still weak, and the evil qi stays in the disease, measures should be taken to avoid re-infection or further changes. In addition to following the doctor's instructions to take medication to support the positive energy and replenish the deficiency, ensuring balanced nutrition, quitting smoking and drinking, and conducting regular check-ups, it is also necessary to avoid wind and cold, be cautious in daily living, and regulate the emotions and moods.

**4. Prevention and control methods at the family level**

Intra-family transmission is one of the main ways of infection. Family members infected with HP are always potential sources of infection and have the possibility of continuous transmission. Screening and treatment of HP infection on a family basis is a practical strategy for the management and control of HP infection in line with China's national conditions [18].

**4.1 Dietary modifications**

Avoid sharing utensils and practice meal sharing among family members to reduce the risk of oral-oral transmission. The diet should be scientific and reasonable, reduce fat, and sweet, thick, spicy and stimulating foods to avoid dampness and heat in the stomach. Antibacterial ingredients such as garlic and dandelion can be consumed as appropriate.

**4.2 Adjustment of living habits**

Tobacco and alcohol can damage the gastric mucosa and increase the risk of HP colonisation, so quit smoking and limit alcohol. Regular work and rest should be followed, and emotions should be regulated to avoid liver qi offending the stomach and wood qi attacking the spleen and earth. Maintaining emotional stability is conducive to spleen and stomach health.

**4.3 Family screening and early intervention**

Family members with a family history of gastric cancer or chronic gastritis are at high risk and should be screened regularly for HP, as HP infection often occurs in family aggregation, and one person with the disease may infect the whole family, so family members living together should be actively tested for the disease to achieve common prevention and treatment in the family [34].

**5. Preventive and curative strategies at the medical level**

**5.1 Chinese medicine and appropriate technology of Chinese medicine treatment**

According to the theory of treating the disease before the disease in Chinese medicine, Chinese medicine and appropriate technology of Chinese medicine can be used for both prevention and treatment of HP infections in the case of desired disease, existing disease, and after disease.

Chinese medicine has a long history of treating gastric diseases, with rich experience and good efficacy, and has been scientifically verified. Clinical treatment is based on evidence-based treatment or phased treatment. The results of numerous studies have shown that TCM can both improve HP clearance and reduce recurrence rates by regulating the overall state of the patient. Taking Half-summer diarrhoea heart soup from the Treatise on Typhoid Fever as an example, as a classic formula in TCM and conciliation, it is a representative formula of the method of both cold and heat adjustment, tonification and diarrhoea, Half-summer diarrhoea heart soup has a definite efficacy in the treatment of Hp-infected cold-heat mismatched chronic gastritis, and its gastric mucosal lesion improvement rate reaches 75% [19]. Gao Yunyun et al [20] found through a network pharmacological study that Hanxia laxative heart soup exerts anti-HP effects through multiple components, targets and pathways, with 150 effective compounds involving 109 potential targets and 96 pathways of action. Appropriate Chinese medicine techniques, such as acupuncture and acupoints, are also effective and are often used in combination with traditional Chinese medicine to improve the efficacy of treatment [21].

**5.2 Combined Western and Chinese medicine treatment**

The worldwide recognised Western medicine combination treatment options of triple therapy and quadruple therapy are not completely satisfactory, because of the increase in drug resistance, which is no longer sufficient to effectively eradicate HP [22], and the increase of adverse reactions and the decrease of adherence, as well as the refusal of some patients to the western medicine treatment options. In recent years, the combination of Chinese and Western medicine against HP is now the main treatment adopted and accepted by most doctors and patients, which is a major trend in the eradication of HP. The ‘2022 Chinese Guidelines for the Treatment of Helicobacter pylori Infection’ suggests the use of a combination of Chinese and Western medicine in areas with low eradication rates of bismuth quadruple regimens or for patients with refractory HP infections, in compliance with individualised treatment strategies and reflecting the characteristics of Chinese medicine's diagnosis and treatment. Studies have shown that certain results have been achieved, and the combination of Chinese and Western medicine is superior to Western medicine alone.

The methods of combining Chinese and Western medicine include the combination of Chinese and Western medicine or the combination of Chinese and Western medicine with Chinese medicine-appropriate technology. Chen Jinfeng et al [23] showed that the total eradication rate of HP could be increased to 89.2% by combining the quadruple therapy with Half-summer Laxative Heart Soup and Jinghua Gastric Kang Gum Pill. Feng Xuan et al [24] treated gastric mucosal alloplastic hyperplasia with Western medicine in combination with Hanxia Laxing Xin Tang and found that the formula inhibited the methylation of p16 and PTEN genes associated with gastric cancer and delayed the progression of the disease to cancer. Liu Ping et al. [25] studied that the eradication rate of traditional Chinese medicine acupoint application combined with triple therapy through meridian conditioning and acupoint stimulation was 87.1%, which was significantly higher than that of 60.7% in the simple triple therapy group, significantly improved gastrointestinal symptoms.

**6 Conclusion**

The prevention and control of HP is a global public health concern, and due to effective interventions, the rate of HP infection has been declining both at home and abroad [26-27]. Currently, there is a lack of effective HP vaccines, and the concept of ‘family-based prevention and control of HP infection’ has been put forward in China, in which prevention of newborn HP infections and eradication of pre-existing infections in family members is a more effective strategy for prevention and control of infections [28]. In recent years, the integration of Chinese and Western medicine in the treatment of HP infection [29] has made great progress, which is the leading edge of our country and has a promising development prospect. We look forward to conducting a large-sample, multi-centre randomised controlled trial of TCM and Chinese and Western medicine protocols with families for scientific in-depth research, which will provide reference data for public health policy making and clinical practice.

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