

The Effects and Mechanism of Yinqiao Powder on Upper Respiratory Tract Infection

Li-Song Liu¹, Na Lei¹, Qing Lin¹, Wei-Li Wang¹, Han-Wen Yan² and Xiao-Hua Duan^{2,3*}

¹The Laboratory of Pharmacology and Chinese Materia Medica Pharmacology of Yunnan University of Traditional Chinese Medicine, Yunnan University of Traditional Chinese Medicine, Kunming 650500, Yunnan Province, China

²The Research and Development Center for Ethno-Medicine & Ethno-Pharmacology Yunnan University of Traditional Chinese Medicine, Yunnan University of Traditional Chinese Medicine, Kunming 650500, Yunnan Province, China

³The Key Modern Research Laboratory for Ethno-Pharmacology of Yunnan Higher School at Yunnan Province, Yunnan University of Traditional Chinese Medicine, Kunming 650500, Yunnan Province, China

Abstract: Pharmacology of Chinese materia medica use modern scientific methods based on the theory of Traditional Chinese Medicine (TCM) to study the interactional regulations between the body and Chinese materia medica. It aims to explain the mechanism and the scientific basis of the effects of traditional Chinese medicine. Research team has found that Yinqiao Powder has good effect on the mouse model of upper respiratory tract mucosal immunity dysfunction induced by cold stimulation with bacteria and viruses. Therefore, the function of Yinqiao Powder in the prevention and in the treatment of upper respiratory tract infection (AURI) cannot be explained only by antibacterial and antiviral properties. The effects of Yinqiao Powder on AURI may be mediated by the improvement of the function of upper respiratory mucosal immune system.

Keyword: Theory of traditional Chinese medicine, Yinqiao Powder, Exterior syndrome, upper respiratory tract infection, mucosal immune.

1. INTRODUCTION

Humans have intentionally or unintentionally understood and mastered natural drugs used in the treatment of diseases in the process of existence, at the same time, Chinese nation recognizes the complex phenomenon of life and diseases in the thinking mode of holism, dynamic and identification, also has mastered the laws of natural drugs for preventing and curing diseases [1-2]. With the language of ancient philosophy and the method of analogy to explain the function and mechanism of Chinese materia medica, the theory of traditional Chinese medicine is a system carrier, which directs Chinese herbs to treat diseases [3]. Treatment based on syndrome differentiation is not only the core content of TCM, but also the basic rule of clinical diagnosis and treatment to diseases [4-8]. In the clinical practice of TCM, the clinical information collected from inspection, listening and smelling, inquiry and palpation (four examinations) are distinguished into which pattern of syndrome [9-11] and then the pattern of syndrome will be used as basis to determine the methods, the prescriptions and the medicines. The theory of TCM is every effective in

directing clinical practice. Even though, nowadays the modern medicine are highly developed, TCM is still one of the important approaches used in the prevention and in the treatment of different diseases.

2. THE CHARACTERISTICS OF TCM

TCM treat diseases based on syndrome differentiation [12]. The only standard to determine the efficacy of Chinese materia medica is the syndrome types' improvement. The syndromes of TCM could be understood as evidence that a pathological generalization of the cause and the position of diseases and the relationship of healthy and unhealthy factors on a certain stage of the disease process, which is an evidence to choose a prescription or medicine. The syndrome of TCM is different from the diseases which are based on modern diagnostics, ecology and the standard of effects evaluation [13-14]. From the perspective of modern medicine, a "syndrome" in TCM could contain a series of "diseases" in modern medicine, but the same modern medicine "disease" could be distinguished into different "syndromes". Therefore, simply using modern medicine recognition to "disease" evaluate the effects of Chinese materia medica is not comprehensive [15]. Pharmacology of Chinese materia medica use modern scientific methods based on the theory of TCM to study the interactional

*Address correspondence to this author at the Laboratory of Pharmacology and Chinese Materia Medica Pharmacology of Yunnan University of Traditional Chinese Medicine, Yuhua Road, Chenggong New District, Kunming, Yunnan Province 650000, China; Tel: (+86) 871-65918160; Fax: (+86) 872-65918160; E-mails: 942702980@qq.com, 1047896527@qq.com

regulations between the body and Chinese materia medica [16]. It aims at explaining the acting mechanism and material basis of the effects of Chinese materia medica, clarifying and understanding the connotation of the theory of TCM and the modern scientific nature [17,18]. It is not only beneficial to play the characteristics and advantages of traditional Chinese medicine and pharmacology, but also has important significance in promoting the development of life science. However, how to use the characteristic of Chinese materia medica itself to choose model and evaluating indicators reasonably becomes the key topic in the research of traditional Chinese medicine and pharmacology.

The association of theory, therapy, prescription and herbs is the specific performance in the process of clinical TCM diagnosis and therapeutic [19, 20]. The therapy is the core relating to the basic theory and the cretaceous square. Prescription is in the inside of therapy, and therapy is decided by patterns. Therefore, there is an important link between theory, therapy, prescription and herbs. A theory conducts a therapy, then the therapy directly guides a prescription and the herbs. So using modern life scientific methods study the prescriptions and herbs representing a theory could not only explain the action principle of herbs, but also could infer the nature of the theory. In this approach, we use the prescriptions and herbs based on "relieving superficies method" to study the action and the mechanism of Chinese materia medica.

3. THE UNDERSTANDING OF TCM AND MODERN MEDICINE ON AURI

3.1. The Understanding of TCM on AURI

Exterior syndrome means a group of symptoms that caused by six climactic or epidemic pestilential affect body through skin and body hair, including aversion to cold with heat, headache and body pain, nasal congestion and runny nose, cough and sore pharynx, and other symptoms. The disease is in lung-defense and fleshy exterior [21]. It also has the characteristics of rapid onset and short duration, therefore TCM doctor usually use relieving superficies and clear and outhrust methods as the first priority to eliminate pathogenic agents as soon as possible. This is to reduce the damage of the external evil affecting the body and to prevent the further development of the disease. Clinically exterior syndrome contains the wind-cold exterior syndrome, wind-heat exterior syndrome. Thus, its common to use the therapies of warm acrid exterior

resolution, cool acrid exterior resolution. The typical prescriptions include Mahuang Tang, Ramuli Cinnamomi Decoction and Yinqiao Powder, and other ingredients [22]. From the angle of symptomatology, we think exterior syndrome is similar with the acute upper respiratory tract infection (AURI), therefore TCM doctors treat AURI with relieving superficies method to identificate patterns. Most clinical studies indicate that exterior-resolving medicinal is effective in treating AURI [23-26]. It is not limited to the improvement of the symptoms of the AURI patients, but also significantly shorten the course and can reduce the recurrence rate.

3.2. The Understanding of Modern Medicine on AURI

AURI is a general designation of acute inflammations caused by viruses or bacteria in the nasal cavity or in the throat [27]. It is also a common clinical infectious disease of respiratory tract, including influenza, and other viral diseases. It was estimated that between 70% and 80% of AURI is caused by viruses [28]. The antiviral drugs merely aim at one or several of the more than 100 kinds of viruses. Moreover, viruses have the characteristics of multifarious hypotypes and fast variability. Therefore, there are difficulties in clinical etiological treatment [29]. In most cases, relieve the symptoms become the first choice, such as symptomatic treatment drugs, antipyretic analgesic and anti-inflammatory drugs, cannot solve the problems radically. Therefore, seeking the effective measures and drugs to prevent AURI has the important practical significance. Yinqiao Powder, with a better clinical effect and the most widely used in the prevention and in the curing of AURI, is usually the first prescription of "Wenbing Tiaobian", at the same time it's an famous exterior-resolving prescription [30,31]. The previous publication described the mechanism of drug action as mainly antipyretic, anti-inflammatory, and antiviral [32,33]. However, other studies for example indicates that Yinqiao Powder has significant anti-inflammatory and anti-allergic properties [34]. It have been also confirmed that Yinqiao Powder can increase the phagocytosis of macrophage [35]. It could not only increase the phagocytic index and phagocytic coefficient in mice, but also could also act against the suppression of humoral immunity induced by cyclophosphamide. Therefore, it can improve the level of serum hemolysin and antibody. However, compared to the chemical drugs, there are no significant advantages of these effects. Therefore, these cannot explain the therapeutic effect of Yinqiao Powder in the treatment of AURI. However, people of

low immunity such as the aged, children and the weak inborn or after illness have the higher risk than healthy people to AURI. In addition, AURI can recur easily so that it's difficult to cure in the long run. WHO has confirmed that the lower immunity is the primary cause of suffering from recurrent of AURI.

The respiratory tract is an open organ, therefore it's easy to connect with the external environment including anaphylactogens and biotoxins continuously. With the increased concentrations of harmful substances in the surrounding environment, air pollution became more and more serious. Therefore, the harmful effect of air to the respiratory tract increased gradually, leads to the mucosal epithelium cilia falling off and the clearance function of muco-ciliary declining. Thus, the mucosal immune of the upper respiratory tract decreases and the body immunity decreases as well. This affects the human general health. The mucosal immune system distributing in the respiratory tract and the digestive tract and is the first defense line of human body to defend against bacteria, viruses and other pathogenic microorganisms [27]. Vander's study shows that AURI break out repeatedly is relating to the lower mucosal immune of respiratory tract [36]. The lower SIgA level and decreasing the activity of lysozyme is an important condition in the incidence of AURI. These also can lead to the chronic upper respiratory tract infection; even AURI becomes bronchitis, pneumonia or the more serious infections. With the stimulation of pathogenic microorganism, local mucosal immune response is activated, and promoting the secretion of SIgA. The produced SIgA could neutralize the viruses, as well as inhibit the pathogen contacting with mucosal epithelium, at the same time it could work with lysozyme and cause bacterolysis. Epidemiological studies have suggested that AURI occurs all the year round. Considering the reasons, on the one hand, the stimulation of cold leads to the increase of respiratory capillary resistance, the reduction of permeability, and the decrease of SIgA and the lysozyme activity [24]. On the other hand, the dry weather of winter easily causes nasal mucosa breaking, so that it's easily that bacteria and viruses invade body [37]. When the temperature drops, the fallen nasal cavity temperature helps the pathogens invading.

4. THE EFFECT OF YINQIAO POWDER ON AURI

Considering the lower mucosal immunity of respiratory tract is an important condition of AURI, research group imitated the basic feature of human's AURI, taking SIgA and lysozyme as the index,

successfully established the mouse model of upper respiratory tract mucosal immunity dysfunction induced by cold stimulation [38]. Then they infected the copied mouse model of upper respiratory tract mucosal immunity dysfunction induced by cold stimulation with bacteria and viruses to observe the effects and the mechanisms of Yinqiao Powder. Research group found that Yinqiao Powder could not only significantly improve the lysozyme activity but also could enhance the SIgA in the saliva. Afterwards, research team confirmed that Yinqiao Powder reduce the mortality rate and prolong survive time. However, the prescription had no protective effect on the upper respiratory tract mucosal immune dysfunction induced by *streptococcus pneumonia* intraperitoneal injection [39]. Later researchers found that Yinqiao Powder could reduce the mortality, prolong survival time and inhibit the lung index of the mice infected by influenza virus.

5. CONCLUSION

In summary, Yinqiao Powder has good effect on the mouse model of upper respiratory tract mucosal immunity dysfunction induced by cold stimulation with bacteria and viruses. Therefore explaining the clinical effects of prevention and treatment of AURI of Yinqiao Powder can not only using antibacterial and antiviral. The actions of Yinqiao Powder on AURI may be considered in relation to the improvement of the function of upper respiratory mucosal immune system.

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