ISSN: 2710-0588 DOI: 10.29556/FSE.202108_1(5).0014

Inhibitory Effect of Traditional Chinese Medicine on Influenza Virus

Jianfeng Huang

School of Ocean, Fuzhou University, Fuzhou, Fujian, 350116, China.

Abstract

Influenza is an acute respiratory infection caused by influenza virus. There are abundant resources of traditional Chinese medicine in China. Since ancient times, traditional Chinese medicine has significant effect of common cold, viral cold, influenza and fever. In view of the advantages of traditional Chinese medicine against influenza virus, this study is mainly based on the method of literature review. The inhibition effect of traditional Chinese medicine on influenza is summarized. Referring to the current research results, the work hope to have some guiding significance for further research.

Keywords

Traditional Chinese Medicine; Influenza Virus; Inhibition.

1. Introduction

Influenza virus is a persistent and profound threat to humans and many animals on a global scale. The resulting diseases cause thousands of deaths and huge economic losses to livestock every year. Obviously, influenza is a highly infectious acute respiratory disease, with worldwide significance. [1]

2. Pathogenic Mechanism of Influenza

Influenza virus is a segmental negative chain IKNA virus belonging to myxoviridae. According to the difference of their nucleoprotein (NP) abt, they can be divided into A, B and C, which are different in genome structure, polypeptide composition, infectivity and pathogenicity. The genome of influenza virus is divided into sections, which is prone to gene redistribution. That is, the different origin of influenza virus gene sections together can form a new virus. Coagulase (H) and neuraminidase (N) are two important antigens of influenza A virus. There are 16 subtypes of HA (H1-H16) and 9 subtypes of Na (N1-N9) due to antigen drift or transfer. Influenza virus binds to sialic acid of polysaccharide receptor on the surface of host cell through HA protrusion (mainly HAL), which makes the virus adsorb on the surface of sensing cell. Sialic acid is usually one of the sugars from the end of receptor sugar chain N to the last second sugar, mainly galactose (Gal) α2, 3 or α2,6 glycosidic bond. The types of sialic acid receptors in tissues are different according to different people and animals. Now, many scholars accept the pathogenesis of the following, the majority of scholars currently accept the pathogenesis of the following. (1) Influenza virus induces apoptosis of host cells, which is one of the important mechanisms of cytopathy. (2) Oxidative stress damage caused by virus infection is also a widely accepted disease mechanism. (3) Cytokine storm theory and other academic theories. [2]

ISSN: 2710-0588 DOI: 10.29556/FSE.202108_1(5).0014

3. Mechanism of Traditional Chinese Medicine and Its Representative Drugs

3.1. Direct Inhibition

Direct inhibition is mainly manifested in one of the links of absorption, penetration, replication and maturation in the process of virus reproduction, so as to inhibit virus reproduction and achieve the purpose of anti-virus. [3]

3.1.1. Forsythia

The active components are phenylethanosides, flavonoids and lignans. [4-6] Zhao Bingqian etc,. [7] evaluate the anti-inflammatory and anti-proliferation effects of Forsythia suspense extract by constructing cell model. The results showed that Forsythia aqueous extract could significantly inhibit the proliferation of H5N1 and H9N2 AIVs in DF-1 cells, and inhibit the expression of various chemokines and cytokines mediated by H5N1 and H9N2 AIVs infection. Pan Zhaozhao etc,. [8] used the method of hemagglutination test to inoculate different concentrations of influenza virus into allantoic cavity of chicken embryo to make the model of influenza A virus infection. The preventive and therapeutic effects of different concentrations of Forsythia Extract on chicken embryo were observed. The results showed that Forsythia Extract had a strong direct killing effect on influenza virus, and had a significant therapeutic effect on influenza virus pneumonia mice.

3.1.2. Honeysuckle

The chemical components of honeysuckle are complex and diverse, and its therapeutic effect is the comprehensive result of interaction and interaction of various active substances in the body. The various components of honeysuckle include organic acids, flavonoids, cyclographene ether, etc. Wang Jiaojiao etc,. [9] extracted honeysuckle with petroleum ether, ethyl acetate and n-butanol, and determined the inhibitory effect of different components on neuraminidase of influenza virus. The results showed that the ethyl acetate fraction of honeysuckle had strong inhibitory effect on neuraminidase, and the IC50 of H3N2 and H1N1 influenza virus neuraminidase were (243.18 0 ± 18.47) μ 34 g / ml and (198 ± 9.67) μ g/ml. Neuraminidase plays an indispensable role in the release and transmission of influenza virus subviruses. [10]

3.1.3. Folium Isatidis

The active ingredient is 4 (3H) quinazolone. Xu Tao etc,. [11] The results showed that the anti-H1N1 influenza virus effects of 4 (3H) quinazolone were different with different dosing methods, and the direct effect of 4 (3H) quinazolone on H1N1 influenza virus was not obvious. However, it has obvious blocking effect on virus, and has inhibitory effect on virus invading cells, and the antiviral effect increases with the increase of concentration.

3.1.4. Coptis Chinensis Ma Weilie etc.

After the preparation of IAV by reverse genetic 8-plasmid virus rescue system, the anti IAV activity of water extract of Coptis was detected by CCK-8 and CPE. The effects of water extract of Coptis chinensis on IAV infection and RNA polymerase activity were studied by luciferase coding gene report system. The results showed that the aqueous extract of Coptis chinensis was safe to MDCK cells in the concentration of 0.25-2.0 gL. The water extract of Coptis chinensis has better anti IAV effect. Compared with the control group, the relative fluorescence intensity of cells in the water extract treatment group was significantly lower ($P < 0.01$). Therefore, the aqueous extract of Coptis chinensis has a strong inhibitory effect on IAV activity and infectivity, which may be related to the inhibition of viral RNA polymerase activity. [12]

ISSN: 2710-0588 DOI: 10.29556/FSE.202108_1(5).0014

3.2. Indirect Inhibition

Indirect inhibition refers to that traditional Chinese medicine has the role of immune promotion, with the help of traditional Chinese medicine to enhance their own immune system to resist the virus. [3,13,14]

3.2.1. Honeysuckle

The effective ingredient is honeysuckle polysaccharide. Jia Wei etc,. [15] The results of antiviral test in vivo showed that the IFN-γ in serum was increased after the polysaccharide of honeysuckle entered the body. It has important immune enhancement and immune regulation function, and has significant regulatory effect on inflammation caused by influenza virus.

3.2.2. Houttuynia cordata

The effective ingredient is Houttuynia cordata polysaccharide. The results showed that Houttuynia cordata polysaccharide could inhibit the release of inflammatory cytokines and the expression of TLR4-NF-κB, by which it can improve the damaged immune and physical intestinal barrier, alleviate the lung and intestinal pathological injury caused by IAV, and improve the survival rate. [16]

3.2.3. Astragalus membranaceus

The effective ingredient is astragalus polysaccharid. Some studies have shown that APS can significantly enhance the non-specific immune function and humoral immune function, significantly improve the phagocytic activity of macrophages, promote the formation of serum hemolysin, and improve the titer of serum antibody. In addition, as interferon inducer, astragalus polysaccharidescan can stimulate macrophages and T lymphocytes, increase the number of cells formed on E-ring, induce cytokines, promote the production of IL-2 and IL-12, and make animal body produce endogenous interferon, so as to achieve the goal of antiviral.[17]

3.2.4. Chinese wolfberry

The effective ingredient is Chinese wolfberry polysaccharide. Liu Wei etc,. [18] mixed the inactivated influenza virus vaccine with different doses of Lycium barbarum polysaccharide and then immunized mice by intraperitoneal injection. Serum was collected three weeks after immunization for specific antibody detection. In the experiment, the aluminum hydroxide adjuvant group was set up as the control group to evaluate the immunoenhancement effect of LBP as adjuvant. The results showed that the level of specific antibody against H5 inactivated vaccine increased with the increase of LBP dose in a certain range.

4. Conclusion

It can be seen from the above that studies have shown that many traditional Chinese medicines not only have the effect of direct inhibition of virus, but also have the effect of indirect inhibition of virus. In the treatment of influenza, there are many kinds of traditional Chinese medicine have good curative effect, but there is no systematic research on this aspect. Therefore, it is an important measure to clarify the mechanism of action of traditional Chinese medicine and build a systematic study of traditional Chinese medicine, which can make traditional Chinese medicine widely used in clinic and promoted worldwide.

References

[1] Pleschka, S., Overview of Influenza Viruses. 2013.

[2] Wang Ting, Pathogenesis of Influenza Virus. China Tropical Medicine, 2011. 11(12).

[3] Wang, X., et al., Anti-influenza agents from plants and traditional Chinese medicine. Phytotherapy Research, 2006. 20(5): p. 335-341.

ISSN: 2710-0588 DOI: 10.29556/FSE.202108_1(5).0014

[4] Zhao Wenhua, Shi Renbing, Liu Bin, Zhang Jinnan, Isolation and Elucidation of Antiviral Substances from Lianqiao Bingduqing Capsule on Influenza. Chinese Traditional Patent Medicine, 2005(04), 81-85.

[5] Jian Yongyao, Qi Longwen, Studies on Chemical Constituents and Pharmacology of Forsythia Suspensa. Journal of Huaihai Medicine, 2009. 27(04),349-350.

[6] Xiao Huimin etc,. Component Analysis of Forsythia Essential Oil and Study on Their Anti-viralActivity. China Medical Herald, 2011. 8(08), 31-33.

[7] Zhao Bingqian etc,. Inhibitory Effect of Forsythiae Fructus Aqueous Extracts on the Proliferation of Avian Influenza Virus and the Expression of Inflammation Factors in Vitro. Acta Veterinaria et Zootechnica Sinica, 2020. 51(06), 1466-1474.

[8] Pan Zhaozhao, Wang Xuefeng, Experimental Study on LianQiao in Resisting Influenza A Virus in Vivo and Vitro. Western Journal of Tradinal Chinese Medicine, 2016. 29(12), 5-8.

[9] Wang Jiaojiao etc,. Inhibitory Effect of Different Components of Honeysuckle on Neuraminidase of Influenza A Virus. China Health Standard Management, 2017. 8(22), 98-100.

[10] Tian Yongshou, Wang Kuanglei, Yang Fei, Wang Boyu, Progress on Inhibitors of Influenza Virus Neuraminidase. Chinese Journal of Medicinal Chemistry, 2017. 27(3), 245.

[11] Wang Xuehong etc,. Xu Tao, Liang Jianping, Yu Sijiu, Pu Xiuying, Study on the Fermentation of Codonopsis pilosula and Bioltansformation of Its Polysacetraride by Chieken Intestinal Bacteria[J]. Journal of Traditional Chinese Veterinary Medicine, 2008. 27(3), 7-9.

[12] Ma Weilie etc,. Effect of Coptis Chinesis Aqueous Extract on Activity of Influenza A Virus. Journal of Guangdong Medical College, 2014. 32(06), 759-762.

[13] Liang Yiping, Zhong Xiuhu. Mechanism and Application Prospect of Traditional Chinese Medicine against Influenza Virus. 2014.

[14] Chen Jiaying, The Effect and Research Progress of Traditional Chinese Medicine on Influenza Virus. Journal of Clinical Medical Literature, 2020. 7(30),192.

[15] Jia Wei etc,. Study on Antiviral Effect of Lonicera Japonica Thumb Polysaccharide in Vivo. Journal of Liaoning University of Traditional Chinese Medicine, 2018. 20(06),25-27.

[16] Haiyan Zhu, X.L.L.L., X.S.Y.L. Yingye Ou and D. Chen, Houttuynia cordata polysaccharides ameliorate pneumonia severity and intestinal injury in mice with influenza virus infection. 2018.

[17] Yu Tong etc,. Effects of Astragalus Polysaccharides and Inactivated H9N2 Subtype Avian Influenza Virus on T and B Lymphocytes in Peripheral Blood of C57BL/6 Mice. Heilongjiang Aninal Science and Veterinary Medicine, 2020(03), 12-16.

[18] Liu Wei, Xu Xinyue, Zhang Fenghua, Chen Zefang, Antibody Responses Induced by Inavtivated Whole-virion H5N1 Vaccine with Lycium Barbarum Polysaccharide as An Adjuvant. Acta Laser Biology Sinica, 2011. 20(3).