Zhifeng Yao et al.

Correlation Analysis of CPN, Hp, HCMV Pathogenic Microorganism Infection Status and Serum Inflammation Marker Level in Patients with Coronary Heart Disease

Correlation Analysis of CPN, Hp, HCMV Pathogenic Microorganism Infection Status and Serum Inflammation Marker Level in Patients with Coronary Heart Disease

Zhifeng Yao
Hong Shen
Minna Tang
Junbo Ge

Junbo Ge1, Minna Tang, Zhifeng Yao, Department of Cardiology, Zhongshan Hospital, Fudan University, Shanghai Institute of Cardiovascular Diseases, Shanghai, PR China, Hong Shen Department of Emergency Medicine, Zhongshan Hospital, Fudan University, Shanghai, PR China,Correspondence author: Junbo Ge, email: junboge2@126.com

Objective: To investigate the correlation between CPN, Hp, HCMV pathogenic microorganism infection status and serum inflammation marker levels in patients with coronary heart disease. **Methods:** The subjects of this study were all patients with coronary heart disease who came to our hospital from December 2018 to December 2019. A total of 70 patients were selected as the observation group, and non-coronary heart disease patients who came to our hospital for physical examination at the same time 70 cases were used as a control group to detect the IgG antibodies of CPN, Hp and HCMV microorganisms of the two groups, as well as the serum inflammation markers interleukin-6, hypersensitive C-reactive protein and tumor necrosis factor-α. **Results:** The CPN-IgG single positive rate, Hp-IgG single positive rate, HCMV-IgG single positive rate, double positive rate and triple positive rate in the observation group were 10.0%, 14.3%, 18.6%, 41.4% and 11.4%, respectively. , Are significantly higher than the control group, and the difference between the groups is statistically significant (P<0.05); interleukin-6, hypersensitive C-reactive protein and tumor necrosis factor-α in three positive patients are (37.4±8.9) pg/ml, (15.1±3.2) mg/L and (36.2±8.6) ng/L, significantly higher than the levels of serum inflammation markers corresponding to double-positive, single-positive and full-negative patients, the difference is statistically significant Significance (P<0.05); serum inflammatory markers of double-positive patients were significantly higher than those of single-positive patients, the difference was statistically significant (P<0.05); serum inflammatory markers of single-positive patients The level of substance was significantly higher than that of serum inflammation markers corresponding to all negative patients, and the difference was statistically significant (P<0.05). **Conclusion:** The infection load of CPN, Hp and HCMV pathogenic microorganisms in patients with coronary heart disease is positively correlated with the level of serum inflammation markers, which is closely related to the incidence of coronary heart disease. The mixed infection of three pathogenic microorganisms can enhance the inflammatory response of patients by inducing inflammation The reaction causes the occurrence and development of the disease, and the more complicated the pathogenic microbial infection of the patient, the higher the level of inflammation markers of the patient.

Coronary heart disease is called coronary atherosclerotic heart disease. It refers to coronary atherosclerotic lesions in the coronary arteries and your blood vessel cavity is blocked or narrowed, causing myocardial hypoxia, ischemia, and necrosis [1]. Coronary heart disease seriously harms people's

Zhifeng Yao et al.

Correlation Analysis of CPN, Hp, HCMV Pathogenic Microorganism Infection Status and Serum Inflammation Marker Level in Patients with Coronary Heart Disease

health and life safety. In recent years, it has been affected by many factors. The incidence of coronary heart disease in China is gradually increasing. The incidence of coronary heart disease in urban areas is higher than that in rural areas. The incidence of coronary heart disease in men is higher than that in rural areas. Women, and the mortality rate of coronary heart disease is very high, so it is of great significance to strengthen the analysis of risk factors and incentives of coronary heart disease [2]. The risk factors of coronary heart disease include modifiable risk factors and immutable risk factors, among which the modifiable factors include overweight, obesity, dyslipidemia, hypertension, diabetes, unreasonable diet, excessive drinking and smoking, etc. Including age, gender and family history. Some studies at home and abroad have shown that the occurrence and development of coronary heart disease are also closely related to the infection of the body. Many coronary heart diseases have chronic microbial infections. Infection and inflammation play a very important role in the pathogenesis of coronary heart disease, Has aroused great attention. In order to explore the correlation between CPN, Hp, HCMV pathogenic microorganism infection status and serum inflammatory marker levels in patients with coronary heart disease, this study took 70 patients

with coronary heart disease as an example to analyze interleukin-6, The levels of hypersensitive C-reactive protein and tumor necrosis factor-α are now reported as follows [3].

MATERIALS AND METHODS

General Information

The subjects of this study were all patients with coronary heart disease who came to our hospital from December 2018 to December 2019. A total of 70 patients were selected as the observation group, and 70 patients with non-coronary heart disease who came to our hospital for physical examination at the same time were selected. As a control group. 70 cases in the control group, including 31 women and 39 men, aged (40-81) years old, average age (66.6±3.2) years old; 29 cases with history of hypertension, 20 cases of smoking history, hyperlipidemia 36 patients had a history of diabetes and 10 had a history of diabetes. Observation group: 70 cases, 30 women, 40 men, age (40-82) years old, average age (67.2±3.1) years old; 30 cases with history of hypertension, 21 cases of smoking, 35 history of hyperlipidemia Cases, 11 cases of diabetes history. Comparing the two groups of patients in terms of age, gender and medical history, the difference was not statistically significant (P>0.05) and was comparable, as shown in Table 1 below.

Table 1.
Comparison of general information between the two groups

Group	Number of cases	Average age (years)	Sex		Medical history (n)			
			Female	Male	History of hypertension	Smoking history	History of hyperlipidemia	History of diabetes
Observation group	70	67.2±3.1	30	40	30	21	35	11
Control group	70	66.6±3.2	31	39	29	20	36	10
P value		>0.05	>0.05		>0.05			

The patients in the observation group met the clinical diagnostic criteria for coronary heart disease and were determined to be coronary heart disease by electrocardiogram and myocardial enzymology. Under coronary angiography, the left anterior descending branch, left main trunk, left quadrilateral branch, and right coronary artery had at least one narrow 50% and above. Patients in

both groups excluded patients with abnormal liver and kidney functions, thyroid dysfunction, diabetes, and various recent acute infections and tumors.

Method

Two groups of venous blood were collected aseptically, and serum was separated. CPN-IgG type antibody, Hp-IgG type antibody, HCMV-IgG

Zhifeng Yao et al.

Correlation Analysis of CPN, Hp, HCMV Pathogenic Microorganism Infection Status and Serum Inflammation Marker Level in
Patients with Coronary Heart Disease

type antibody are all measured by enzyme-linked immunosorbent assay, strictly according to the method in the kit, and the number of positives is counted. Interleukin-6 and tumor necrosis factor-α were measured by chemiluminescence enzyme analysis method, and detected by fully automatic chemiluminescence instrument, and hypersensitive C-reactive protein was measured by latex enhanced scattering immunoturbidimetry method, using a specific protein analyzer and the matching reagents are used for testing, and all testing is strictly in accordance with the kit and instrument procedures.

Statistical analysis

Statistical analysis will use SPSS13.0 statistical analysis software for calculation. Using a two-sided test, a P value of less than or equal to 0.05 will be considered statistically significant. The measurement data will be described statistically using the mean ± standard deviation, paired t test, the count data will be described statistically by frequency (composition ratio), and the x^2 test will be used.

RESULTS

Positive comparison of CPN, Hp and HCMV antibodies between the two groups

The CPN-IgG single positive rate, Hp-IgG single positive rate, HCMV-IgG single positive rate, double positive rate and triple positive rate in the observation group were 10.0%, 14.3%, 18.6%, 41.4% and 11.4% It is obviously higher than the control group, and the difference between the groups is statistically significant (P<0.05). See Table 2 below for details.

Table 2.
Positive comparison of CPN, Hp and HCMV antibodies between the two groups [n (%)]

Group	Number of cases	CPN-IgG single positive	Hp-IgG single positive	HCMV-IgG single positive	Double positive	Triple positive	All negative
Observation group	70	7（10.0）	10（14.3）	13（18.6）	29（41.4）	8（11.4）	3（4.3）
Control group	70	3（4.3）	5（7.1）	6（8.6）	10（14.3）	1（1.4）	45（64.3）
P value	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Comparison of serum inflammatory markers in patients with coronary heart disease with different pathogenic microorganism infection

The levels of IL-6, hs-c-reactive protein and TNF-α were (37.4±8.9) pg/ml, (15.1±3.2) mg/L and (36.2±8.6) ng/L in Sanyang patients, which were significantly higher than those in double positive, single positive and all negative patients (P<0.05) The level of serum inflammatory markers in single positive patients was significantly higher than that in all negative patients (P<0.05). See Table 3 below for details

Table 3.
Comparison of serum inflammation marker levels in patients with coronary heart disease with different pathogenic microorganism infection status (x ± s)

Group	Number of cases	Interleukin-6 (pg/ml)	High-sensitivity C-reactive protein (mg/L)	Tumor necrosis factor-α (ng/L)
All negative	3	1.6±0.4	1.4±0.4	6.0±1.2
Single positive	30	4.8±1.1*	3.1±0.6*	8.4±2.5*
Double positive	29	17.2±4.3*#	6.4±2.1*#	17.3±4.2*#
Triple positive	8	37.4±8.9*#△	15.1±3.2*#△	36.2±8.6*#△

Note: * means P<0.05 compared with total negative; # means P<0.05 compared with single positive; △ means P<0.05 compared with double positive.

DISCUSSION

The pathogenesis and mechanism of coronary heart disease are very complex. In recent years, the relationship between infection and the occurrence and development of coronary heart disease has aroused great attention, and some different views and arguments have emerged. CPN is Chlamydia pneumoniae, HP is Helicobacter pylori and

Zhifeng Yao et al.

Correlation Analysis of CPN, Hp, HCMV Pathogenic Microorganism Infection Status and Serum Inflammation Marker Level in Patients with Coronary Heart Disease

HCMV is human cytomegalovirus. These three pathogens are the pathogens with high infection rate. Chlamydia pneumoniae is a very common pathogen of human respiratory diseases, belonging to the specific intracellular parasite, which can reproduce in the smooth muscle cells, endothelial cells and macrophages of the body. It has the same effect as lipopolysaccharide, can induce the host to produce significant endotoxin response, and can also induce the production of adhesion molecules and cytokines Body persistent infection plays an important role in the pathogenesis of coronary heart disease and atherosclerosis, which may be one of the causes of inducing and aggravating coronary heart disease. Helicobacter pylori is a kind of microorganism that can survive in human stomach, and it is also the only kind of microorganism that can survive in stomach. The International Cancer Research Institute of the World Health Organization has included the infection of Helicobacter pylori into a list of carcinogens and proposed that Helicobacter pylori infection is the risk factor of inducing cancer. Helicobacter pylori infection can cause peptic ulcer, gastritis and lymphoproliferative habit of gastric lymphoma. Helicobacter pylori infection is very common, more than half of the people in the world have been infected with Helicobacter pylori, and even more than 90% of people in some countries have been infected with Helicobacter pylori. In general, people have been infected with Helicobacter pylori in their childhood. Once infected, it will cause chronic gastritis, and lead to the occurrence of gastric atrophy and gastric ulcer, which will seriously develop into gastric cancer. Helicobacter pylori can act on the arterial wall of human body, resulting in endothelial cell damage and local inflammation, and cause lipid peroxidation, lead to cholesterol accumulation, thus forming atherosclerosis, or lead to the occurrence of atherosclerosis, leading to coronary heart disease. Therefore, Helicobacter pylori infection may also be a risk factor for coronary heart disease. Human cytomegalovirus infection is also very common. Human cytomegalovirus can be encapsulated in monocyte macrophages, which makes it more difficult for human cytomegalovirus to be removed from cells. The virus will not degrade, so that it can survive in human monocyte macrophages. Human infection with human cytomegalovirus can induce endothelial cells to express viral glycoprotein, which leads to coagulation. In addition, the inflammatory reaction and virus infection will cause certain damage to the human endothelial cells, thus affecting the endothelium dependent vasodilation function of the body, eventually causing thrombosis and vasospasm. Human cytomegalovirus infection may be the initiating factor of atherosclerosis [4].

In this study, the CPN-IgG single positive rate, Hp-IgG single positive rate, HCMV-IgG single positive rate, double positive rate and triple positive rate of the observation group were 10.0%, 14.3%, 18.6%, and 41.4, respectively. % And 11.4% are significantly higher than the control group, the difference between the groups is statistically significant (P<0.05); this also shows that Chlamydia pneumoniae infection, Helicobacter pylori infection and human cytomegalovirus infection on coronary heart disease of the disease is dangerous [5].

The formation of atherosclerosis is very complex, involving many complex processes, and inflammation caused by a variety of infections may be one of the important mechanisms of atherosclerosis. It has been speculated that atherosclerosis may be a special chronic inflammatory fibroproliferative disease. Interleukin-6 is the central regulator of inflammatory response, mainly derived from activated monocytes, endothelial cells and fibroblasts. It is an important factor to promote bone marrow hematopoiesis and can effectively increase the number and activity of platelets. Generally, it is regarded as an important indicator to evaluate tissue injury and severity of injury. Hypersensitive C-reactive protein is one of the start factors of atherosclerosis. When the body is inflamed, it will be synthesized by a large number of hepatocytes, thus promoting complement

Zhifeng Yao et al.

Correlation Analysis of CPN, Hp, HCMV Pathogenic Microorganism Infection Status and Serum Inflammation Marker Level in Patients with Coronary Heart Disease

activation and leading to immune damage. Highly sensitive C-reactive protein has a direct relationship with the formation of atherosclerosis and the rupture of plaque. It can predict the risk of future coronary events. Therefore, it can be regarded as a risk predictor of coronary heart disease. TNF-α is a non-glycosylated transmembrane protein, which is mainly produced by activated macrophages and monocytes. It has a variety of biological effects, and is related to endothelial cell damage, inflammatory transmitter release and inflammatory cell aggregation. It can cause cell necrosis, inflammation and damage the blood vessel wall. Because TNF-α can promote the formation of atherosclerosis, it is closely related to the occurrence and development of coronary heart disease. In this study, the levels of IL-6, CRP and TNF-α in Sanyang patients were (37.4±8.9) pg / ml, (15.1±3.2) mg/L and (36.2±8.6) ng/L, respectively, which were significantly higher than those in the double positive, single positive and all negative patients (P<0.05) The level of serum inflammatory markers in single positive patients was significantly higher than that in all negative patients (P<0.05) [6]. The results showed that the infection load of pathogens was positively correlated with the concentrations of IL-6, hs-c-reactive protein and TNF - α.

CONCLUSION

In summary, the CPN, Hp, HCMV pathogenic microbial infection load in patients with coronary heart disease has a positive correlation with the concentration of interleukin-6, hypersensitive C-reactive protein and tumor necrosis factor-α in patients, with With the increase of pathogen infection load, the concentration of patients' serum inflammatory markers is also increasing, indicating that a variety of inflammatory factors are synergistically involved in the occurrence and development of coronary heart disease.

REFERENCES

1. Shen Yunfeng, Hu Yuangui, Zhang Hongbo. Correlation between microbial infection status of coronary heart disease and three inflammatory markers in serum [J]. Laboratory Medicine and Clinical Medicine, 2015, 000 (002): 169-171.
2. Hu Jiajun, Ma Sheng. Effects of different types of Helicobacter pylori infection on inflammatory factors and blood lipid levels in elderly patients with coronary heart disease [J]. Chinese Journal of Multiple Organ Diseases in the Elderly, 2019,32 (6): 54-55.
3. Sun Yuguang, Liu Huixia. Inflammatory factors and blood lipid levels of Chlamydia pneumoniae in patients with coronary heart disease [J]. Journal of Cardiovascular Rehabilitation Medicine, 2015,28 (02): 33-36.
4. Yang Xuhang, Wen Yining. Relationship between inflammation and infectious factors and TCM syndromes of coronary heart disease [J]. Journal of Shandong University of Traditional Chinese Medicine, 2010,18 (02): 52-53.
5. Huang Yong, Li Weihua, Yin Hong, et al. Correlation between Helicobacter pylori infection and plaque characteristics, lipid metabolism and inflammatory response in patients with coronary heart disease [J]. Chinese Journal of Arteriosclerosis, 2019, 027 (008): 713-717.
6. Wang Xinmei, Zhang Baoxia, Ding Jie. Effect of anti-Helicobacter pylori treatment on serum Hcy level and inflammatory factors in patients with coronary heart disease [J]. Clinical Research in Medicine, 2016, 25 (33): 2063.