

Original Research Article

Research status of relationship between schistosomiasis and colorectal cancer

Xingguang Yang*, Jiwu Yang, Xiangnong Cun, Pengju Zhao, Wei Cheng, Haibin Shi, Yi Li

The First Affiliated Hospital of Dali University, Dali, Yunnan Province 671000, China. E-mail: yxguangdoc@163.com

Abstract: In clinical practice, intestinal mucosal inflammation caused by schistosomiasis has great risks to lead to tumor proliferation and migration of cancer cells. Without timely and effective intervention, chronic schistosomiasis infection induced will further deteriorate into colorectal cancer. On the whole, schistosomiasis once caused serious infection to China. Patients suffering from colorectal cancer who have been infected with schistosomiasis can be diagnosed as schistosomiasis-related colorectal cancer if their preoperative intestinal tract has infection manifestations and postoperative pathology indicates that eggs are deposited near the focus. This paper explores the relationship between schistosomiasis and colorectal cancer by combining relevant data and literature at home and abroad.

Keywords: Chronic schistosomiasis; colorectal cancer; literature review

Schistosomiasis was once a very common infectious parasitic disease all over the world, which caused quite serious adverse effects on human's health and life safety, especially in non-cold regions. In China, schistosomiasis has lasted for quite a long time, even far exceeding the history of modern medicine. Meanwhile, colorectal cancer used to be a high incidence of malignant tumor in countries with developed economy. With the promoting of Asian countries' economic level year by year, the incidence of this disease has increased by about four times. Modern medicine has proved that there is a correlation between schistosomiasis and colorectal cancer. This paper will summarize its research status based on the relevant literature, with the details as follows.

1. General situation of schistosomiasis

1.1 Concept

Fundamentally speaking, schistosomiasis is an infectious disease caused by parasitic schistosomiasis in human body. A conservative estimate of countries affected by this disease is approximately 70 around the world, which may cause hundreds of thousands of people to be infected or even killed each year, seriously affecting human health. Common schistosomiasis include three kinds, namely *Schistosoma japonicum*, *Schistosoma mansoni* and *Schistosoma haematobium*, among which *Schistosoma japonicum* has the most significant impact on China.

Generally speaking, schistosomiasis is closely related to agricultural production and water conservancy systems, with extremely high potential. In addition, poor living conditions and insufficient prevention will lead to its neglect and further spread. Among the several types of schistosomiasis, chronic diseases developing to advanced stage cause the most severe damage to human body, with quite a high risk of inducing colorectal cancer. At present, schistosomiasis is still a serious public health problem for most developing and poor countries.

Copyright © 2023 Xingguang Yang *et al.*

doi: 10.18282/g.s.v3i1.833

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

1.2 Analysis of epidemiology

Since 1950, more than 400 districts and counties in the Yangtze River basin and the southern region of China have been affected by the disease. Although appropriate and timely measures have been taken to prevent and control the diseases, eliminating most of them, there are still cases in some epidemic areas. According to the research report of Han Lianxiu and Yang Jianghua^[1], survey results in 2015 showed that the main schistosomiasis epidemic areas in China include lake and marsh areas (Hunan Province, Jiangxi Province and Hubei Province), water network areas (Jiangsu Province and Zhejiang Province) and hilly areas (Yunnan Province and Sichuan Province); by the end of 2015, transmission is basically controlled and blocked. Colorectal lesions induced by schistosomiasis are extremely subtle. For example, in his book, Huang Shaoping^[2] mentioned a 62-year-old female patient who suffered from repeated abdominal distension and pain and didn't get better after treatment and intervention of anti-infection and spasmolysis. She was initially diagnosed as intestinal tuberculosis, but turned out to be schistosomiasis enteropathy, with intact eggs and inflammatory cell infiltration, which was confirmed by CT.

2. Analysis of the mechanism of inflammation-cancer transformation between schistosomiasis and colorectal cancer

2.1 Analysis of mechanism of inflammation-cancer transformation

Wu Na *et al.* ^[3] have proved in their works that reaction of chronic inflammatory bowel may transform into colorectal cancer. For patients with schistosomiasis enteropathy in an advanced stage, mature worms are able to parasitize in human mesenteric veins. Their eggs deposit in intestinal mucosa (or submucosa), gradually causing persistent immune inflammatory reaction and obvious acidophilic abscess. After a period of time, it will lead to significant fibrosis of intestinal wall and pseudopolyps, thus bringing about hidden risks for intestinal canceration. In addition, there are enormous data and literature proving that after schistosomiasis infection, it may develop into schistosomiasis-related colorectal cancer after 10 years or more of latency. In other words, the longer the history of schistosomiasis infection is, the more dense egg accumulation will occur in the focus inside the human intestinal tract, increasing the risk of canceration.

The research report of Rong Zeyin and Huang Chen^[6] also proves that the pathogenesis of schistosomiasis-related colorectal cancer includes: first, endogenous cancer factors induced by schistosome infection and the toxin of schistosome itself lead to the attenuation of body immunity and imbalance of chronic immune; second, the inflammatory mediators formed by chronic inflammation interact with each other to induce canceration. Generally speaking, chronic inflammatory reactions may be associated with about 20% of cancers in the history of human medicine, which may induce physiological dysfunction caused by environmental effects, diet structure, genetic effects, external infection, etc. and interact to form canceration. Inflammatory reaction may defend against harmful substances in human body at the onset of disease, but after continuous accumulation, it will cause damage to tissues and accelerate canceration, which is called "mechanism of inflammation-cancer transformation". For example, long-term chronic atrophic gastritis transforms into gastric cancer, and viral hepatitis finally transforms into liver cancer, which prove the existence of this mechanism. Correspondingly, it can also prove the occurrence of inflammation-cancer transformation between schistosomiasis enteropathy and colorectal cancer. In addition, the stimulation effect of chronic inflammatory reaction caused by egg antigen on endothelial cells of human intestinal mucosa will also cause a large number of growth, induce type IV hypersensitivity reaction, gradually form granuloma, further induce thickening of intestinal wall, and hinder the normal function of intestinal tract. Moreover, some studies have suggested that intestinal flora disturbance and pathogenic bacteria infection may also lead to colorectal cancer. Clinical reports have shown that immune suppression reaction of schistosomiasis enteropathy patients leads to the breeding of some bacteria, and subsequent infection may cause canceration as well. For example, maladjusted T cell immune response and carbohydrate expression in intestinal mucosal epithelial cell membrane may induce gene mutation and accelerate canceration.

2.2 Clinical study on schistosomiasis-related colorectal cancer

In his work, Cheever^[4] has proved that schistosomiasis-related colorectal cancer is more common in rectum and sigmoid colon in clinic. Its pathological type is mainly adenocarcinoma, with relatively high differentiation level, but low malignant degree, which may be related to the characteristics of human intestinal wall (especially the hyperplasia of fibrous tissue in submucosa forms a binding area, which further hinders the metastasis of cancer cells through lymphatic channels). Patients with schistosomiasis-related colorectal cancer mostly have the following characteristics: first, the level of tumor marker serum CA-125 is extremely high; second, staged early pathology; thirdly, irregular wall thickening, annular calcification and soft tissue mass (mass with unclear boundary) can be clearly seen undergoing CT examination. This provides specific clinical reference for the clinical diagnosis of patients with schistosomiasis-related colorectal cancer.

In their works, Miao Yongyuan and Kang Xiuchun^[5] carried out a retrospective analysis on the clinical treatment effect of 50 patients with schistosomiasis-related colorectal cancer. They adopted resection surgery combined with chemotherapy (or radiotherapy) to carry out treatment. They proved that schistosomiasis has greater hidden dangers to cause multiple colorectal cancer. Combined with timely and effective treatment and radiotherapy or chemotherapy, the lesions can be removed, with ideal prognosis effect, short hospitalization time and early postoperative food-taking. However, from clinical experience, it still needs to be confirmed by more comprehensive multi-center research and control research to verify whether surgical treatment is suitable for all patients with schistosomiasis-related colorectal cancer, especially the elderly patients with high incidence of the disease, so as to truly ensure the prognosis and survival of patients.

3. Conclusion

To sum up, although schistosomiasis infection is basically eliminated under the current medical background, its impact is still obvious, especially that schistosomiasis enteropathy is common in clinic. As for the actual situation of clinical medicine, schistosomiasis infection is closely related to the onset of colorectal cancer. Therefore, attention should always be paid to the clinical work of prevention and treatment of schistosomiasis. Compared with simple colorectal cancer, the clinical characteristics of schistosomiasis-related colorectal cancer are slightly different. To be specific, its onset is more inclined to the elderly, and its pathological characteristics are more complex. It's quite significant to accurately diagnose it. For example, both CT and serum CA-125 have prominent guiding significance. Last but not least, more clinical studies are needed to ensure the good prognosis of patients.

References

1. Han L, Yang J. Study on the relationship between schistosomiasis and colorectal tumors. *Journal of Parasitic Biology* 2018; 13(2): 210-212. doi: 10.13350/j.cjpb.180225
2. Huang S. Analysis of one case of schistosomiasis enteropathy misdiagnosed as intestinal tuberculosis (in Chinese). *Chinese Journal of Misdiagnosis* 2010; 10(4): 871-872. doi: CNKI:SUN:ZWZX.0.2010-04-113
3. Wu N, Liu Y, Zhu Y. Diversity of gut microbiota in patients with colorectal cancer. *Chinese Journal of Clinicians (Electronic Edition)* 2014; (22): 4069-4072. doi: 10.3877/cma.j.issn.1674-0785.2014.22.032.
4. Cheever AW. Schistosomiasis and colon cancer. *Lancet* 1981; 317(8234): 1369-1370. doi: 10.1016/S0140-6736(81)92547-2.
5. Miao Y, Kang X. Analysis on therapeutic effect of 50 cases of schistosomiasis with multiple primary colorectal cancer (in Chinese). *China Health Care and Nutrition* 2013; 23(5): 2357. doi: 10.3969/j.issn.1004-7484(s).2013.05.193.
6. Rong Z, Huang C. Research progress of colorectal cancer with schistosomiasis.
7. *Journal of Modern Oncology* 2019; 27(2): 160-164. doi: 10.3969/j.issn.1672-4992.2019.02.040.