

# STUDIES ON CLINICAL MANIFESTATIONS, DIAGNOSIS AND CONTROL OF PARAGONIMIASIS IN CHINA

Xu Zhi-Biao

Beijing Tropical Medicine Research Institute, Beijing, People's Republic of China.

**Abstract.** Paragonimiasis is a common parasitic zoonosis in China. Its clinical manifestations may be classified into two clinical entities, eg, paragonimiasis *westermani* type and paragonimiasis *szechuanensis* type. The latter mainly manifests as trematode larva migrans. The immunodiagnostic methods frequently used in the diagnosis of paragonimiasis are intradermal test, CFT and ELISA. The detection of circulating antigens in patients has been used in China for diagnosis and bithionol and praziquantel are drugs of choice in the treatment of paragonimiasis. Combined measures including mass survey, mass treatment and health education have been found to be effective in the control of paragonimiasis in China.

## INTRODUCTION

Paragonimiasis is a common and important food-borne parasitic zoonosis in China. Significant achievements have been made in studies of its various aspects since 1950s. Following the extensive epidemiological surveys carried out in China, it has been shown that paragonimiasis is occurring in 19 provinces and autonomous regions in China (Fig 1).

Paragonimiasis is acquired through eating raw or wine soaked "drunken" crabs and occasionally raw shrimp in South China, through eating raw crab meat, raw crab-sauce, or crab-jam in Southwest China and through eating raw crayfish or crayfish-curd containing live metacercariae in Northeast China.

## CLINICAL MANIFESTATIONS

There are two distinct clinical entities seen in paragonimiasis in China (Ho, 1986):

1. Paragonimiasis *westermani* type. The clinical manifestations of this type is classical and is characterized by cough, expectoration, hemoptysis with jam-like brownish-red rusty sputum often accompanied with ova. Subcutaneous nodules due to worm migration occasionally occur in *Paragonimus westermani* infection but not in *P. tuanshanensis*.

There are six clinical forms of *P. westermani* infection: (1) pleural-pulmonary form, (2)

abdominal form, (3) cutaneous form, (4) scrotal form, (5) central nervous system form and (6) spinal form.

2. Paragonimiasis *szechuanensis*. This is a new clinical entity first recognized by Chung (Zhong) and Ts'ao (Cao) (1962a, b). The etiological agents of this type are *P. szechuanensis*, *P. hueitungensis* and *P. skrjabini*. Its striking clinical features are mainly the manifestations of "trematode larva migrans" associated with migratory subcutaneous nodules, high white blood cell count, marked eosinophilia with neither hemoptysis nor ova in the sputum of patients. Migratory subcutaneous nodules occurred in 30-60% of the cases studied and usually contained juvenile flukes in biopsied specimens. Brain involvement such as subarachnoid hemorrhage was frequent. Numerous eosinophils were also found in the pleural effusion and cerebral spinal fluid. Complement fixation test of the cerebral spinal fluid in these cases were positive, but no ova could be found.

There are seven clinical forms: (1) cutaneous form, (2) abdominal form, (3) pleural-pulmonary form (pleural effusion contains neither worms nor ova, but complement fixation test (CFT) is positive), (4) pericardial form (the pericardial fluid contains numerous blood cells, 30-97% being eosinophils), (5) cerebral form (usually there is cerebral and/or subarachnoid hemorrhage, and the cerebral spinal fluid may be bloody containing red blood cells and eosinophils

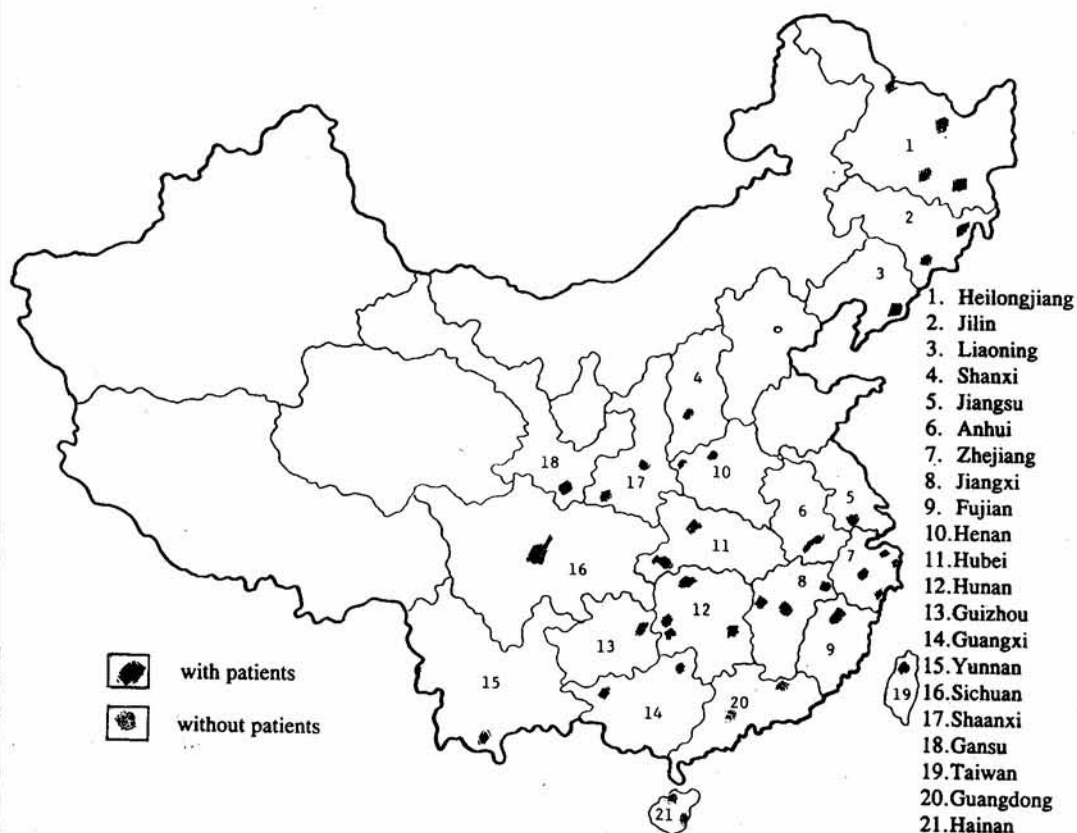


Fig 1 - Distribution of paragonimiasis in China.

and the CFT is positive), (6) ocular form (unilateral exophthalmos due to *P. szechuanensis* penetrating into the ocular fossa has been reported), (7) subclinical form (the intradermal test and seroimmunodiagnostic tests are positive with or without eosinophilia, but without significant clinical symptoms).

#### DIAGNOSIS

Paragonimiasis can be diagnosed by a history of eating raw crabs, crayfish or shrimps in the endemic areas plus clinical manifestations and finding of ova in sputum. Immunological methods including intradermal test, CFT, indirect hemagglutination test (IHA), indirect fluorescent antibody (IFT), enzyme-linked immunosorbent assay (ELISA) have been applied as supplementary diagnostic methods, but they are used

for the confirmation of the diagnosis in the case of *P. szechuanensis* infection. Pathologic examination of biopsied subcutaneous nodules has also been used for the diagnosis of paragonimiasis szechuanensis. The detection of circulating antigen of *Paragonimus* with monoclonal antibodies by ELISA has been successfully carried out in 97 cases by Lu *et al* (1988) yielding a positive rate of 98.97% (96/97). Studies on the application of DNA probe in the diagnosis of paragonimiasis have also been tried.

#### TREATMENT

Since 1951, many drugs including chloroquine, bithionol, hexachloroparaxylyl (hetol), niclofolan, praziquantel and albendazole have been used in the treatment of paragonimiasis.

Due to the low efficacy, long therapeutic course and toxic reactions, chloroquine is no longer being used in treatment of this disease. Niclofolan was extremely effective with a single dose of 2 mg/kg, but its visual toxic reactions even causing blindness seen in the treatment of clonorchiasis sinensis (2 mg/kg for 2 days) limited its usage. Drugs for choice in the treatment of paragonimiasis are bithionol and praziquantel.

In 1964, 4,610 cases of paragonimiasis were treated with bithionol in Kuantian and Fengcheng Counties in Liaoning Province (Paragonimiasis Control Station of Liaoning Province). The immediate therapeutic effect was almost 100%. One year later, 3,969 cases were re-examined and 115 relapsed (2.9%). The overall one year cure rate was 97.1%. The relapse rate for pulmonary paragonimiasis was 2.83% (107/3,786 cases) and for the cerebral type it was 4.37% (8/183).

Cao (1984) reported the result of praziquantel in the treatment of 40 cases of paragonimiasis westermani at dosages from 60 to 225 mg/kg given in 1/3 days. Its average cure rate was 67.5%. The cure rate of 22 cases in this series with a total dosage of 225 mg/kg (ie 75 mg/kg/day for 3 days) was the best, 86.3% (19/22 cases). Li (1984) treated 31 cases of paragonimiasis westermani with a dosage of 15 mg/kg 3 times a day for 2 days or 25 mg/kg twice a day for 2 days; the cure rates were 66% and 68% respectively resurveyed 14 months after the treatment. The recommended dosage for the treatment of cases of paragonimiasis westermani is 75 mg/kg/day for 3 days.

Liu (1986) used praziquantel in the treatment of 24 persons with the subcutaneous form of paragonimiasis skrjabini at a dosage of 210 mg/kg divided into 3 days; the cure rate was 100%.

Albendazole is also effective in the treatment of paragonimiasis szechuanensis, Liu (1987) reported the result of the drug in the treatment of 103 cases. The subcutaneous nodules disappeared in 67 cases and reduction in size in 36 cases. The nodules completely disappeared in all 103 cases resurveyed at 2-6 months after treatment.

## CONTROL

Various control programs have been carried out in endemic areas. Medical personnel went to the endemic areas and worked together with local physicians to control this parasitic zoonosis. They carried out epidemiological surveys and treated all patients. Through various public health propaganda measures such as radio broadcasts, posters and pamphlets, they informed the people of the cause of the disease and the method for prevention, and recommended not to eat raw or undercooked fresh water crustaceans. They treated all infected dogs and cats if their owners refused to kill them. Through the application of combined control measures, the prevalence and incidence of the disease has been dramatically reduced in endemic areas especially in Kuantian and Fengcheng counties, Liaoning Province. For example, in these two counties, the treatment of over 9,000 cases, with bithionol plus other above mentioned control measures, the prevalence rate of the disease was dramatically lowered from 21% to 0.6% in 1973. The incidence of positive skin tests among primary school children in Tumenling Village in Kuantian County was 30-50% with a morbidity rate of 10-20%. After vigorous therapy and prevention over the 18 years no active cases were found in this village in 1980.

Recently, a health education project on the control of paragonimiasis has been carried out in Xiuning County, Anhui Province and in Kinganshan and Lianhua Counties, Jiangxi Province funded by the International Development Research Center of Canada (IDRC). Six villages in these two provinces were selected as project sites and two villages (one in each province) as control sites. The health education program including various training courses (mainly for primary school teachers and pupils), dissemination of the knowledge about prevention of the disease through radio, movies, slides projection and also posters has been carried out in project sites. All patients found in the survey were treated with praziquantel. The number of persons who understood the cause for the disease has been increased from 2% to 98.8% in Jiangxi and from 9.3% to 99.3% in Anhui after

the health education program. The number of persons eating raw crabs were significantly decreased from 48.3% to 0 in Jiangxi and from 50.3% to 0.3% in Anhui after this program. No significant changes have been seen in the infection rate of crabs and the positive rate of skin and ELISA tests. Observations on the changes in incidence and prevalence of the disease should be taken for a much longer time, however.

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