

FASCIOLA HEPATICA INFECTION IN CHINA

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Abstract. *Fasciola hepatica* is one of the most common parasites in China that infects ruminants, especially cattle, sheep and goats, and causes considerable morbidity and economic losses in the animal husbandry. The climate in wide areas of China is suitable for the development of *F. hepatica* and its intermediate snail hosts. However, human infection with the fluke is not common. Up to now, 38 hospital patients and six infected individuals from two epidemiological surveys have been reported in the Chinese literature. *F. gigantica* infection in herbivorous animals is comparatively rare compared to *F. hepatica* infections, and only one case was reported in man (Wang, 1984). This paper reviews mainly human infections with *F. hepatica* in the Chinese literature. Animal infections of the parasite are also briefly described.

EPIDEMIOLOGICAL CHARACTERISTICS

Human infection with the fluke is determined by the presence of the intermediate snail hosts, herbivorous animals and human behavior.

Geographical distribution

Sporadic infections are usually the case. No outbreak of fascioliasis has been recorded in man in China in contrast to ruminants. The total of 44 persons with *F. hepatica* infection was distributed in the provinces of Liaoning, Jilin, Gansu, Hebei, Henan, Shangdong, Hubei, Jiangxi, Sichuan, Guizhou and Guangdong, the municipality of Beijing, and the autonomous regions of Inner Mongolia and Guangxi Zhuang, covering a wide area which includes northern, middle, and southern parts of China. As the symptoms and signs are not pathognomonic and thus the infection may not be identified correctly, the actual number of human cases is undoubtedly much greater than that reported. Only two small-scale epidemiological surveys have been carried out in China, one in a village in Jilin Province and the other in a primary school in Hebei Province. Two and four persons infected with the parasite were identified by stool examinations among 340 villagers and 83 school children, respectively. Although the prevalence of human infection is usually very low as a whole, in some areas,

where the climate is suitable for the snail hosts and the parasite, and human dietary habits of eating raw vegetables and drinking unboiled water exist, comparatively higher prevalence, as seen in the primary school in Hebei, may happen.

Mode of transmission

A few cases have had a history of eating raw watercress or other vegetables (Lu and Li, 1965; Zhang *et al*, 1983; Yao *et al*, 1989), which acts as a vehicle of transmission, while most of the infected cases denied having such behavior. However, drinking unboiled water from a pond, stream or river is common among people in the rural areas. Since eating raw vegetables is not the habit for the majority of Chinese, the transmission route in these persons may be through drinking unboiled water, or from metacercaria-contaminated cutting boards and other kitchen utensils. This may be the reason of low prevalence of the infection in humans in contrast to higher prevalence in herbivorous animals in the same areas.

Profession

Fascioliasis is predominantly a rural disease. All patients were from rural areas, especially pastoral areas.

Age and sex distribution

Although all age groups can be affected,

children under 15 years of age accounted for about half of the infected subjects. Since children like to swim in a pond or stream and sometimes to keep grasses in their mouth, they get the infection through swallowing metacercariae in the contaminated water and on the grasses. Distribution by sex is almost equal.

Family clustering

Nine cases from four families had the infection (Anonymous, 1978; Zhu *et al*, 1979; Zhang *et al*, 1983; cited by Mao, 1990), ie, two, three, two and two cases, respectively. This is most probably because the families share the same contaminated food and water.

Animal infections

Cattle, sheep and goats are the main animal hosts of the fluke. In some areas, the infection rates are quite high. For instance, the infection rates were as high as 89.2% of 65 (Huang *et al*, 1983) and 67.2% of 271 (Huang, 1986) in cattle. Infections in other domestic animals have also been recorded. They are sheep, goats, water buffalos, yaks, deer, sika, rabbits, pigs and horses (She *et al*, 1981; Han *et al*, 1983; Min *et al*, 1983; Zhang *et al*, 1985; Jiang, 1987; Wang *et al*, 1987).

CLINICAL PRESENTATIONS

Apart from six persons from two epidemiological surveys who are subclinical and symptomless, all the 38 hospitalized patients had significant symptoms and/or signs. Abnormality in some laboratory findings is also predominant.

Symptoms

Among the 38 hospital patients, the number of cases with major clinical symptoms recorded were fever (34), abdominal pain (29), loss of appetite (22), vomiting (3), diarrhea (3), lassitude (20), emaciation (17), chest pain (3), asthma (2), non-productive cough (3), hemoptysis (3). Fever is usually the first symptom and is often abrupt, sometimes accompanied by shivering and sweating. In most cases, pyrexia is remittent, intermittent or irregular. Abdominal pain is usually generalized at the outset, but usually

becomes localized at the right hypochondrium or below the xyphoid.

Physical signs

On physical examination, 31 cases showed hepatomegaly and liver tenderness upon palpation. The size of the liver ranged from just palpable to 12 cm (Sun *et al*, 1984) below the xyphoid. Splenomegaly (seven cases) was not as frequent as hepatomegaly, nor did the spleen get very large. Jaundice was detected in nine cases and ascites in 13 cases.

There were two cases with subcutaneous nodules, one in the chest (Zhang *et al*, 1983) and the other in the abdominal wall (Lu and Li, 1965). Both were diagnosed as subcutaneous *F. hepatica* infections with an immature fluke.

Laboratory findings

Anemia was common and was seen in 25 cases. Hemoglobin concentrations ranged from 28 to 100 g/l. A higher differentiation count for eosinophil was seen in most (29) of the cases ranging from 5% to as high as 71%. Erythrocyte sedimentation rate was high in seven cases recorded, from 68 to 158 mm at the end of one hour. Liver function tests were abnormal in the majority of the patients including higher serum bilirubin levels (2–7 mg/dl), elevated serum glutamic pyruvic transaminase and glutamic oxaloacetic transaminase, thymol turbidity, zinc sulfate turbidity and serum globulin, while serum albumin was decreased. A high serum globulin level (7.3 g/dl) with gamma globulin predominating (52%) was seen in a 10-year-old boy against a low albumin level (2.8 g/dl) (Lu, 1987). Abnormal cephalin-cholesterol flocculation tests (at or higher than ++) were common. Serum immunoglobulin (Ig) levels for IgM and IgG were elevated in patients examined. Ascites was exudative in nature. Leucocyte counts in the ascitic fluid were often higher than 1000/mm³ and eosinophils predominated. In one case they accounted for 92% of the total cells (Zhu *et al*, 1979).

Death

In the hospital series, death was recorded in eight patients. One patient died due to cerebral

abscess and was considered to be irrelevant to the fluke infection. *F. hepatica* infection was identified only at autopsy when 11 adult flukes were found in the duodenum (Pan and Huang, 1954). In the other seven cases death was related to the infection. The causes of death were biliary bleeding in one (Lu, 1987), hepatic and general failure in five (Anonymous, 1977; Zhu *et al*, 1979; Duan *et al*, 1986) and not mentioned in one (Luo and Tan, 1988).

It should be pointed out that the above-mentioned clinical appearance does not reflect the typical clinical findings of the infection and is obviously biased towards the severe form of the disease in patients who had to be hospitalized. Since human infection with *F. hepatica* is not common in China and physicians are unfamiliar with its manifestations, it could be expected that a considerable number of infections might be misdiagnosed as other disorders and not treated correctly. Those with light infections or in the latent phase of the infection easily escape detection. In comparison with the general description of the infection from a review of the literature in the world by Chen and Mott (1990), the 38 hospital patients seem to have more severe infections.

DIAGNOSIS

The diagnosis of the 44 infected subjects was mainly parasitological. The identification of *F. hepatica* eggs in the stool (Huang and Zhang, 1983; Wang, 1983; Zhang *et al*, 1983; Yang, 1984; Huang, 1986) or in the duodenal or biliary drainage (Chen and Mao, 1980; Liu and Han, 1980; Sun *et al*, 1984; Yang, 1984; Zhou, 1984; Zheng *et al*, 1986; Lu, 1987; Yao, 1989) was the main means for the diagnosis. Adult or immature flukes and/or eggs were found in the biliary tract or in the bile at exploratory laparotomy in patients with obstructive jaundice of unknown cause (Tang, 1954; Zhu *et al*, 1979; Liu and Han, 1980; Duan *et al*, 1986; Zheng *et al*, 1986). Histological examination of liver biopsy material showing egg granuloma in the white subserous nodules of the liver or sections of the fluke led to a conclusive diagnosis of the infection (Anonymous, 1978; Zhu *et al*, 1979; Duan *et al*, 1986). In five cases the diagnosis of fascioliasis was clear only at autopsy by

finding the immature or mature flukes in the biliary tract (Anonymous, 1977; Zhu *et al*, 1979; Duan *et al*, 1986).

TREATMENT

Safe and effective drugs for treatment of the infections are now available and different drugs have been used.

Man

Bithionol (bitin) has been considered to be the drug of choice in the treatment of human *F. hepatica* infection in China. The drug is given in dosages of 50 mg/kg body weight daily divided into three doses for 10 to 15 alternate days or longer. When eggs persist in the stool or from duodenal drainage, a second treatment course follows. The drug is not toxic to man although gastrointestinal disturbance is common.

Other therapeutic drugs used were: 1) hexachloroparaxylol (hetol) in the form of an emulsified powder and at a dosage of 50–70 mg/kg body weight daily divided into two doses for seven consecutive days with good therapeutic effect (Wang *et al*, 1981; Sun *et al*, 1984; Yang *et al*, 1984), 2) emetine, and 3) praziquantel. Emetine is also effective but can only be used in experienced hands due to its known toxicity (Tang, 1954; Lu *et al*, 1987), while praziquantel showed no significant efficacy (Yang *et al*, 1984). However, an identified *F. gigantica* adult worm was expelled after a small dose (200 mg) of praziquantel was used, as reported by Wang (1984).

Ruminants

The following drugs have been used:

Niclofolan. The therapeutic effect was excellent when a 2–6 mg/kg single dose was used to treat cattle (Jin *et al*, 1984; Song, 1986), yaks (She *et al*, 1981), sika (Han *et al*, 1983) and goats (Weng, 1983), and no deaths due to toxicity of the drug were recorded.

Other chemotherapeutic agents used were albendazole (Min *et al*, 1983; Zhang *et al*, 1985; Cai and Jin, 1986), bithionol (Zhang *et al*, 1985; Jiang, 1987), amoscanate (Lan, 1986), diamphenetide (Jin *et al*, 1985; Wang, 1987),

and pentachlorosalicylanilide (Cai, 1981). All showed good efficacy. However, death was reported in cattle after treatment with bithionol. When a single dose of 50 mg/kg body weight was given to 60 cattle, two died, and when a higher dose (100 mg/kg body weight) was given to 98 cattle, 42 suffered from serious side effects and 10 died (Jiang, 1987). The author suggested that when bithionol is used to treat *F. hepatica* infections in cattle, the dose should not be higher than 40 mg/kg body weight with a ceiling of 10 grams of the drug for one animal.

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