# STUDIES ON EFFICACY OF PRAZIQUANTEL AND MEBENDAZOLE-MEDICATED SALT IN TREATMENT OF *ECHINOCHASMUS FUJIANENSIS* INFECTION

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**Abstract.** The therapeutic effect of praziquantel and mebendazole-medicated salt has been studied in 109 cases with *Echinochasmus fujianensis* infection. These cases were randomly divided into four groups: 2 groups with a single dose of praziquantel 5mg/kg or 2.5mg/kg; and other 2 groups with mebendazole 800mg or 400mg in 10d table salt. Four weeks after treatment, the egg negative conversion rates were 100%, 92.3%, 85.2% and 71.4% respectively, the egg reduction rates were 84.8-100%, and side-effects were mild. The symptoms caused by infection such as abdominal pain, diarrhea, distension and anorexia were obviously relieved. These data indicated that praziquantel is the drug of choice in the treatment of *Echinochasmus fujianensis*. The dosage is only 2.5mg/kg, and its egg negative conversion rate and reduction rate reach 92.3% and 95.4%, respectively. For convenience, the dosage can be made according to their age. Children under 12 take half a tablet (100mg), and one tablet (200mg) for those over 12. This dosage is approximately equal to 2.5-5.0mg/kg. Although the efficacy of mebendazole is lower than praziquantel, its egg negative conversion rate also reaches 71.4-85%. Mebendazole-medicated salt can be used for treating *Echinochasmus fujianensis* infection as the presence of co-infection with nematodes.

## INTRODUCTION

*Echinochasmus fujianensis* Cheng 1992 is a trematode of fish origin distributed in the southern part of Fujian. The infection rates of man and final-host animal are 3.2% (117/3,652) and 21.4% (179/839) respectively. The symptoms of the infection are abdominal pain, diarrhea, emaciation, anemia. It can also hinder the normal growth of children. The drug for treatment of this fluke has not yet been reported in the medical literature. We found that the number of eggs *Echinochasmus fujianensis* decreased obviously when we treated coexisting intestinal nematodiasis with mebendazole-medicated salt in inhabitants in Longhai in 1993 (Cheng, 1993). It indicated that mebendazole is efficacious in the treatment of *Echinochasmus fujianensis* infection. Hence we studied the effectiveness of praziquantel and mebendazole-medicated salt in the treatment of *Echinochasmus fujianensis* infection in order to find which one is the better drug and its appropriate dosage.

## MATERIALS AND METHODS

### General data

We examined the fresh feces by Kato-Katz method for the detection of *Echinochasmus fujianensis* infection in inhabitants. Altogether 109 cases were diagnosed, 62 males and 47 females. Sixty-four percent of them were under the age of 15, among them 35 cases were preschool children, 64 cases were students, 21 cases were farmers. All cases had a history of drinking unboiled water, gargling with unboiled water or eating raw vegetables. 46 cases had the history of eating undercooked fish, but they all had not eaten raw fish. During the recent three months, 94 cases complained of abdominal pain, 58 cases also were infected with intestinal nematodes, the paralled-infection rate was 53.2%. Of them, 41 cases were infected with hookworm, 23 cases with round-worm, and 14 cases with whipworm.

### Drug, dose and grouping

Praziquantel is produced by Shanghai Tianping Pharmaceutical Factory, each tablet contains 200mg, the batch number was 911,103. Mebendazole-medicated powder is produced by Shangxi Hanjian Pharmaceutical Factory (batch number 930608). Mebendazole-medicated salt was prepared by mixing powder with 80g salt. The course of treatment was ten days. All cases were randomly divided into four groups on the basis of to their age, sex and EPG. 109 cases with *E. fujianensis* infection were

randomly divided into four groups, A and B groups where treated with praziquantel in a single dose of 5mg/kg or 2.5mg/kg, C and D groups were treated with 800mg or 400mg mebendazole in 10d food salt, (approximately equal to 80mg or 40mg mebendazole per person per day). Groups A and Group C were observed for the efficacy of treatment by driving out flukes: each patient took $MgSO_4$ 10-30g two hours after taking praziquantel (or 2 hours after lunch when eating mebendazole-medicated salt). They had to drink boiled water to get rid of the fluke smoothly.

**Curative effect and side reactions**

We have inquired from each patient about side reactions during the therapeutic course and examined the fresh feces by the Katz method one week and four weeks after the treatment. The egg negative conversion rate and egg reduction rate were used as the indices of assessment. All patients were followed up for at least one month.

## RESULTS

**Negative conversion rate**

One week after treatment, the egg negative conversion rates of groups A, B and C were 96.4%, 92.3% and 85.2%, respectively. There was no significant statistical difference among these 3 groups ($X^2 = 2.24$, $p > 0.05$). The egg negative conversion rate of group D was 67.9%, there was significant statistical difference between groups D and groups A and B ($X^2 = 7.79$; 4.16, $p < 0.01$). Four weeks after treatment, the egg negative conversion rates of group A, B, C and D were 100%, 92.3%, 85.2% and 71.4%, respectively. The last group was markedly lower than the first two ($X^2 = 195.51$; 66.21; 22.85, $p < 0.01$).

One week after treatment, the egg reduction rates of groups A, B, C and D were 98.0%, 95.5%, 91.5% and 82.6%, respectively. The last group was markedly different from the first three ($X^2 = 157.8$; 87.63; 37.52, $p < 0.01$). It was very similar in egg reduction rates among these four groups four weeks after treatment ($X^2 = 195.51$; 66.21; 22.85, $p < 0.01$).

**Efficacy of driving out flukes**

We examined seven cases from group A by collecting their feces six hours, one day and two days after medication for counting the number of flukes excreted. Altogether 874 flukes were found, of which 720 (82.4%) and 154 (17.6%) flukes were found after six hours and one day respectively, but no flukes were found after the second day. We sampled four cases from group C, and collected their feces after six hours, one day, two days, three days, four days and five days after treatment. In total, 219 flukes were found. No flukes were found after six hours and on the fifth day, 39 (17.8%), 95 (43.4%), 72 (32.7%) and 13 (5.9%) flukes were found at first, second, third and fourth day of the treatment respectively. Each man expelled 11-529 flukes on average. Flukes were expelled rapidly after the administration of praziquantel. The flukes might be expelled as soon as three hours after treatment, these flukes were all dead, and their bodies were grey and stiff, but their cuticles, head collars and collar spines were all distinct and intact. The flukes excreted from those patients treated with mebendazole-medicated salt were elongated and deformed. Most of their cuticles were destroyed, the head collars and collar spines were damaged or broken and the cuticular spines had disappeared.

**Side reactions of drug**

All patients completed their therapeutic course. The rates of side reactions in group A, B and D were 10.7% (3/28), 7.7% (2/26) and 11.1% (3/27) respectively. The rate of side reactions in group C was 28.6% (8/28). The side reactions in these four groups were mild and with short duration. The side reactions commonly seen were abdominal pain, anorexia, malaise. They naturally disappeared without any treatment.

**Symptom-relief**

One month after treatment, abdominal pain was still present in 7 cases, anorexia in 4 cases, diarrhea, headache, malaise and each in 3 cases,weakness 2 cases. In comparison with those untreated, the symptom relief rates were 92.5% (87/94), 90.2% (37/41), 91.9% (34/37), 88.5% (23/26), 89.7% (26/29) and 91.3% (21/23) respectively, most of the symptoms were relieved.

## DISCUSSION

*Echinochasmus fujianensis* is a kind of small fluke belonging to the family of Echinostomatidae. Although its size is small, the number of flukes parasitizing a host is large. Our data showed that the smallest number of parasites in one case was more than ten with the largest being 529. The

pathogenesis of this parasitosis is still unknown. According to the data of dissecting naturally or experimentally infected animals, the worms mainly parasitize the upper portion of the small intestine of the host. They protruded into the intestinal wall with their head-spines, and cuticular-spines, and attached to the mucosa via the oral sucker and assimilated nutriment, excreted metabolites and toxins. Hosts often had inflammation in the alimentary canal intermittently causing the symptoms such as abdominal pain, diarrhea, abdominal bloating gurgling and jaded appetite. The data showed that there was a close relationship between the symptoms and EPG. The symptoms were mild when the host was only infected with a few flukes, often being misdiagnosed as other diseases. When the host was infected with more flukes, the symptoms included anorexia, headache, anemia, emaciation and dysplasia (besides the symptoms mentioned above).

We experimentally infected three dogs each with 6,000 metacercariae. After ten days, all dogs had poor appetite, then they had diarrhea, bloating and became emaciated. One dog died. On autopsy its intestine was full of waterish pus and mucus. The mucosa of the small intestine had multiple ulcers and hemorrhages, with many fluke bodies and eggs. Out of the 109 cases, 53.6% of them were also infected with intestinal nematodes which couldn't be controlled by praziquantel. After treatment, the symptom-relief rate reached 88.5-91.9%, thus it indicated that the etiological pathogen must be *Echinochasmus fujianensis*. We should pay more attention to this parasite.

Praziquantel is good in controlling fluke infections. The dosage is only 2.5mg/kg, and the egg negative conversion rate is 92.3%, the egg reduction rate is 95.4% four weeks after treatment. Praziquantel is widely used in treating flukes, tapeworms and cysticercus infections. The concentration of the disinfestation in various body fluids and various tissues are different, so the dosage and course of treatment must also be different. In our study, the dosage was only 1/24 of that used for treatment of chronic schistosomiasis. No severe side reaction has been observed. Praziquantel is cheap and easy to take, its therapeutic course is short and its effect for driving out flukes is good. The body of the fluke driven out is intact, and it's convenient to be observed and identified. Hence praziquantel is the drug of choice for the treatment of *Echinochasmus fujianensis* infection. For convenience, the dosage can be administrated according to age. Children under 12 take half a tablet (100mg) and those over 12 take one tablet (200mg) each time. The dosage is 2.5-5mg/kg, and it is efficacious with mild side reactions.

Mebendazole is used for treating intestinal nematodiasis, tapeworm infection, and echinococcosis, the cure rate of taeniasis reaches 100%. This drug is efficacious and is widely used in controlling intestinal worm infection. It can inhibit the worm absorbing glucose, and cause a shortage of glycogen, and it can also prohibit the worm from producing ATP, hence killing the worm. In our study, although the efficacy of mebendazole was lower than praziquantel, its egg negative conversion rate reached 71.4-85.2% with mild side reactions. When the dosage of mebebdazole was 800 mg, the egg negative conversion rate was 85.2%, there was no significant difference with that of praziquantel. Mebendazole-medicated salt have been applied widely in the control of intestinal nematode infection in Guangxi Province. Therefore, mebendazole-medicated salt can be applied for treating the mixed-infection of intestinal nematodiasis. The intestinal nematodes such as hookworms are widely distributed in the south of Fujian, where there are many rivers and canals and a lot of fish ponds; it is also an endemic area of *E. fujianensis*, hence mebendazole-medicated salt is good for controlling intestinal nematodiasis and *E. fujianensis* infection in this area.

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