

# A VILLAGE CLUSTER OF PARAGONIMIASIS IN VIENTIANE PROVINCE, LAO PDR

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**Abstract.** Human infection by the lung fluke *Paragonimus* sp is endemic in Lao PDR. Screening of patients with chronic cough was undertaken in February-March 2003 in Hinheub District, Vientiane Province. In a single village, microscopy of sputum from 33 patients demonstrated *Paragonimus* sp eggs in the sputum of 12 patients, whereas none was positive for tuberculosis. Eleven patients had peripheral blood eosinophil counts above the normal range. They were treated with praziquantel, and followed for 2 months. The main symptoms included cough for more than 3 months, weight loss, and hemoptysis. Eleven patients had gross chest x-ray abnormalities, which were mostly bilateral and included ill-defined heterogeneous consolidation, micro-cavities, nodules, pleural effusions, and calcifications. *Paragonimus* sp eggs and eosinophils were also found in pleural fluid. The effect of treatment with praziquantel 25mg/kg tid for 3 consecutive days was assessed.

## INTRODUCTION

Paragonimiasis is a rarely-reported food-borne zoonosis, caused by the lung fluke *Paragonimus westermani* and occasionally by other related species. Transmission occurs through consumption of undercooked or raw freshwater crabs and shrimps, which are frequently eaten in Southeast Asia. Lao PDR has been documented among the endemic countries in this area. While conducting a field survey of tuberculosis in Vientiane Province, targeting people suffering chronic cough, we identified 12 cases of paragonimiasis in a single village, among 33 such patients. The village was Naphong, in Hinheub District, which consisted of 1,416 inhabitants of the Lao Theung ethnic group. We report the epidemiological, clinical, radiological, and follow-up findings.

## MATERIALS AND METHODS

All cases were identified by direct microscopic examination (x 400) of a non-stained, non-centrifuged, sputum specimen. All specimens were also stained with Ziehl-Neelsen and examined for acid-fast bacilli. The patients-or their parents-were asked to answer a questionnaire addressing food and cooking habits, especially crab consumption, and the frequency and situation of such consumption. With written consent, positive subjects were directed to the district hospital where they underwent: a) complete clinical examination; b) three additional daily microscopic sputum

examinations (unstained and Ziehl-Neelsen); c) blood smear and eosinophil count; d) a chest x-ray; and e) thoracosynthesis for large pleural effusions. Each patient with paragonimiasis received a three-consecutive-day course of praziquantel (75mg/kg/day in three divided doses). Patients were followed up two months after therapy had been completed, and further assessed at month 6 with a final chest x-ray examination.

## RESULTS

One case was lost to follow-up; hence, most results are given for 11 patients. Seven/11 cases were children under 16 (Fig 1). The male/female ratio was 6:5.

### Clinical data

All patients had chronic cough lasting from 3 to 36 months (mean 12 months). Night sweats were reported by 6 / 11 patients (Fig 2). Vital signs were normal in all patients. Temperature at time of clinical examination was within normal ranges for all patients. Clinical findings on chest auscultation were scarce. Three cases had bilateral crackles, and two had basal dullness. No peripheral lymph nodes were found. Five patients had clinical anemia with conjunctivae pallor and most patients reported weight loss and had reduced body weight with a mean Body Mass Index (BMI) of 15.9 (range 13.8-21.6).

### Sputum examination

Most sputum specimens (7/11) contained blood (rusty sputum), whereas 4 specimens were mucous or muco-purulent (Fig 3). The median number of eggs per specimen was 5 (Fig 4). One case had positive sputum at first examination (Fig 5), but was negative on subsequent ones. The same patient had eggs present in the pleural fluid. All sputum specimens were negative for acid-fast bacilli.

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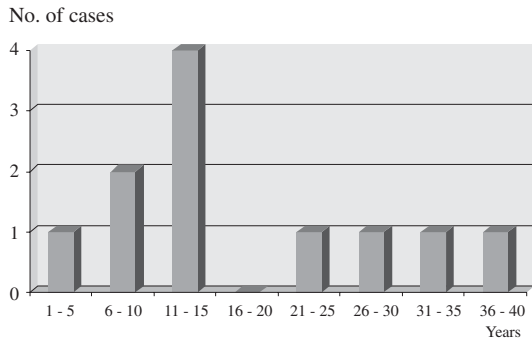


Fig 1- Age distribution of patients (n=11).

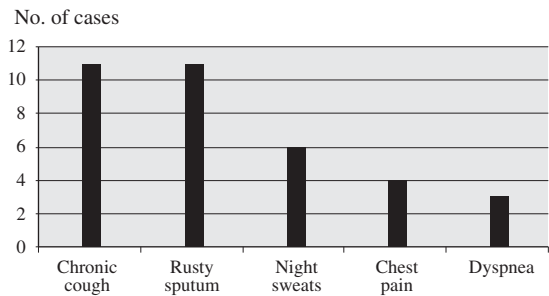


Fig 2- Frequency of signs (reported) and symptoms (n = 11).

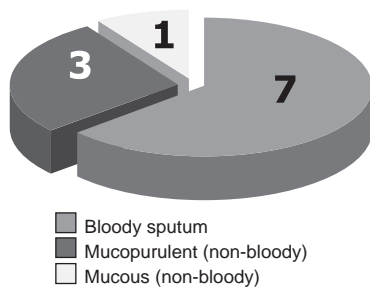


Fig 3- Macroscopic character of sputum (n=11).

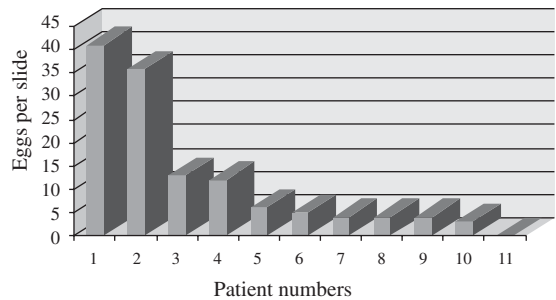


Fig 4- Average number of *Paragonimus* sp eggs in sputum specimens (per slide).

**Blood count**

Anemia was present in 7/11cases (*ie* Hb<13g/dl, 12g/dl, and 12g/dl for adult males, adult females, and children, respectively). In all eleven patients who were tested, the eosinophil count was elevated: mean value 1,190 / mm<sup>3</sup> (range: 510-6,118) (Table 1).

**Chest x-rays**

All patients but one had abnormal chest images. Most patients (9/11) had bilateral changes of the consolidation type, ill-defined and heterogeneous (10/ 11), with frequent micro-cavities (7/11) and micro-calcifications (Fig 6). Pleural effusion was present in 5 cases (bilateral in 4; large volume in one) (Fig 7). No evidence of mediastinal lymphadenopathy was present. One patient had upper lobe cavitation, suggesting tuberculosis.

**Pleural effusions**

For one patient, with large volume effusions, thoracocentesis was performed repeatedly over days. The pleural fluid had a sticky bloody appearance and contained 20 eggs/ml (Fig 8) and 16% eosinophils, 43% lymphocytes, 41% polymorphonuclears.

**Praziquantel treatment**

All, but one, patients received oral praziquantel

75 mg/kg/day (in 3 divided doses/day) for 3 consecutive days, whereas one took only one daily dose. One month after treatment, all 10 patients who completed treatment were free of symptoms, and had negative sputum. Further reassessment, clinically, by eosinophil count, sputum examination, and by chest x-ray, is planned. The only patient who did not complete the treatment, a child with bilateral pleural effusion, still had symptoms, an unchanged x-ray picture and *Paragonimus* sp eggs in both sputum and pleural fluid after three months.

**Dietary questionnaire**

All patients, both adults and children, had consumed raw or undercooked freshwater crab. Crabs, belonging to the *Cardiosoma* sp and *Sayamia* sp (named by Ministry of Agriculture and Forestry, Lao PDR) were caught either in nearby rivers or in the rice fields. Crab meat was given by parents or relatives for therapeutic purposes, *ie* alleged anti-pyretic properties, to 6 affected cases (4 children).

**DISCUSSION**

Paragonimiasis is endemic in southeastern Asia, notably in Thailand, southern China, and the Mekong

Table 1  
Blood-count of paragonimiasis patients (11 cases).

	Min	Max	Mean	Normal value (/mm <sup>3</sup> )
Total leukocytes	6,400	13,300	6,500	< 10,000
Eosinophils	510	6,118	1,190	< 500
Lymphocytes	1,280	3,996	3,193	< 5,000
Polymorphonuclear cell	2,112	5,742	4,200	< 7,000

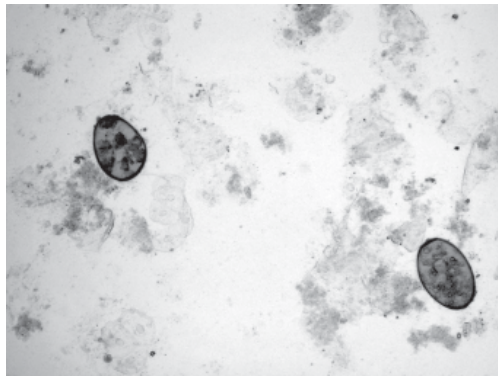


Fig 5- *Paragonimus* sp eggs in sputum.

River area (Mayer, 1979; Bunnag *et al.*, 1981; Brown *et al.*, 1983; Yee *et al.*, 1992), but foci have also been described in other parts of the world, such as central Africa and Mexico. Cases have been documented in different provinces of Lao PDR (Savanakhet, Vientiane, Xiengkhuang, Phongsali, Sekong, Luang Prabang, and Houa Phan) (Bunnag *et al.*, 1981; Carre, and Houmdaophet, 1998), mostly as anecdotal reports, and in Lao immigrants to the USA. Unpublished data collected in 2001-2003, by WHO, the Vientiane Faculty of Medical Science, and IFMT, documented 20 sporadic cases in Luang Prabang and Saravane provinces. However, the present study is the first to identify clustered cases, and to suggest that paragonimiasis prevalence may exceed that of TB in some settings.

Clinical features mimic tuberculosis (TB) in many aspects, including the presence of pleural effusions (Mukae *et al.*, 2001; De Frain and Hooker, 2002; Meehan *et al.*, 2002), weight loss, and hemoptysis. However, fever is generally not a feature of paragonimiasis, and both diseases could be distinguished by eosinophilia in blood or pleural fluid and by roentgenographic features.

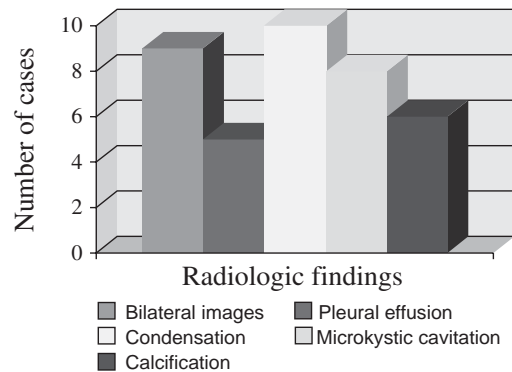


Fig 6- Frequency of radiologic findings (n = 11).

There is a paradox with paragonimiasis: although diagnosis is fast and easy to perform, and treatment is effective, this parasitic disease may be largely overlooked due to lack of awareness by most healthcare workers. We are aware of several patients treated for up to six months for TB, who did not respond to treatment, and who were finally-but tardily-confirmed as having paragonimiasis rather than TB. Seldom is paragonimiasis considered at the time of sputum or pleural fluid examination, usually in search for TB, despite the fact that the shape and size of *Paragonimus* sp eggs make them easily recognizable in types of specimens that rarely harbor other parasites.

In conclusion, during a TB field survey, a cluster of paragonimiasis was identified in a single village near Vientiane. Twelve subjects, half being children, were found among 33 screened for chronic cough. Although all had consumed raw crab, they were initially suspected of having TB. However, none of the 33 subjects had acid-fast bacilli at repeated sputum examinations, whereas *Paragonimus* sp eggs were easily found at first examination. Based on this very limited and preliminary study, we would suggest: a) to consider this easily-diagnosed and treated parasitic

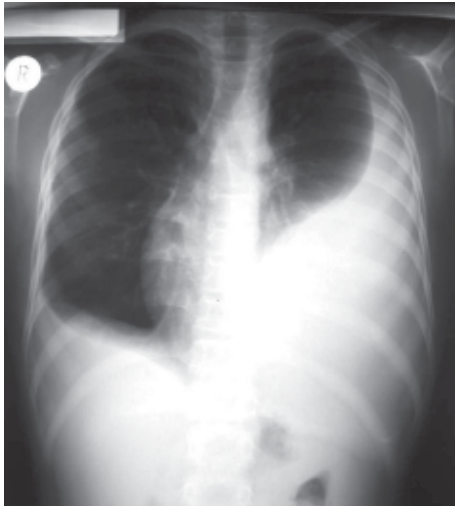


Fig 7- X-ray of paragonimiasis case.

disease in a more systematic way; b) to educate villagers, to make them aware of the hazards of raw crab consumption; c) to educate health care workers to avoid confusion with TB and promote the appropriate use of praziquantel, which is also effective against the liver fluke *Opisthorchis viverrini* (which is also highly prevalent in the same area); d) and finally, to recommend a systematic search for *Paragonimus* sp eggs each time a sputum or a pleural fluid specimen is processed. This village study on paragonimiasis is ongoing, trying to assess parasitic clearance, mid-term thoracic imaging and sequelae, and behavioral and nutritional changes.

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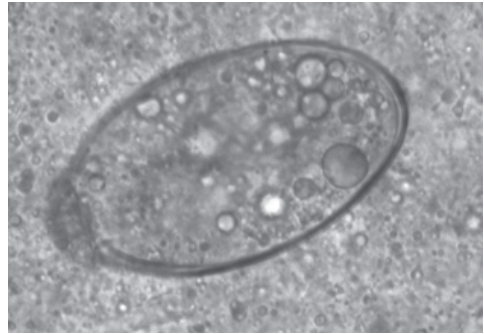


Fig 8- *Paragonimus* sp egg in pleural fluid.

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