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Control of *Schistosoma mekongi* in Cambodia: results of eight years of control activities in the two endemic provinces

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Summary In Cambodia, schistosomiasis is transmitted in the provinces of Kratie and Stung Treng where approximately 80 000 individuals are estimated to be at risk of infection. The baseline prevalence of infection was estimated to be between 73% and 88%, and cases of severe morbidity (hepatosplenomegaly, puberty retardation) and mortality were very common. In 1994, the Ministry of Health of Cambodia started schistosomiasis control applying universal chemotherapy with praziquantel (40 mg/kg). The coverage of the programme was between 62% and 86% for 8 years. This simple control measure resulted in the control of the disease: no cases were reported in 2004 and only three cases were reported in 2005. In addition, there are no longer reports of cases of severe morbidity due to schistosomiasis. Since the beginning of the control programme, a single dose of mebendazole (500 mg) has been combined with praziquantel during the mass chemotherapy; as a result the prevalence of *Ascaris lumbricoides* and hookworms dropped from 74.5% to 10% and from 86% to 40% respectively. The experience in Cambodia demonstrates that, with political commitment, control of parasitic diseases is achievable even in a situation of minimal resources. The programme represents a successful model for other developing countries.

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1. Introduction

Schistosomiasis is one of the most prevalent parasitic infections in the world. It is endemic in 76 countries and continues to be a public health concern in the developing world (Engels et al., 2002). In Cambodia the disease is caused by *Schistosoma mekongi* (Voge et al., 1978), and the intermediate host is *Neotricula aperta*, a river snail that lives in the fissures of partially submerged rocks (Mouchet, 1995). Pigs and dogs have been found to be animal reservoirs of the parasite (Strandgaard et al., 2001). Symptoms and signs associated with *S. mekongi* infection include cachexia, hepatosplenomegaly, stunting and retardation of puberty, portal hypertension, ascites and rupture of oesophageal varices (Biays et al., 1999). Pathology associated with the infection consists in periportal thickening and portal vein enlargement (Hatz, 2001).

In 1994, 20 villages in Kratie Province were identified as the origin of severe cases of schistosomiasis (Stich et al., 1999). In the same year, the Ministry of Health started control activities with the initial support of Médicins Sans Frontières (MSF) and subsequently of the WHO. The control measures consisted mainly of periodic administration of praziquantel (40 mg/kg) to the entire population, except for children under 2 years of age and pregnant women.

At the same time, surveys were conducted to accurately establish the extent of the endemic area. From 2000, the campaigns covered districts in Stung Treng Province, which were inaccessible in the past due to lack of security. Since 2001, the campaign has covered 80 000 people in Kratie and Stung Treng (Figure 1). No new endemic areas have been identified since then.

The parasitological stool surveys carried out for schistosomiasis monitoring also revealed high infection rates for soil-transmitted helminths (STH). This finding led to the simultaneous administration of mebendazole (single dose 500 mg) to all the individuals treated with praziquantel.

The data presented in this paper were collected for monitoring purposes. Despite some gaps and lacks of continuity in the intervention, and in the data collection and recording (due to temporary lack of funds, armed conflicts and other unpredictable events), we consider the present data to be interesting for managers of similar programmes.

The paper aims to demonstrate that a major reduction of schistosomiasis prevalence can be obtained with mass distribution of anthelminthics and that this can be obtained also in a situation of minimal resources. The paper also shows the feasibility of integrating different anthelminthics in the same distribution system.

2. Materials and methods

2.1. Identification of the endemic area

Epidemiological assessments were conducted in the zones previously reported as endemic: Kratie (Audebaud et al., 1968; Jolly et al., 1970), Strung Treng (Urbani and Socheat, 1997), Rattanakiri and Kampong Cham (Ijima, 1970).

Three methods were used in order to delimit the area of intervention:

- questionnaires
- stool surveys in households and schools
- serological surveys.

Normally the first investigation was done with a questionnaire and then the positive data confirmed with parasitological or serological methods.

Over 30 000 questionnaires were distributed in the provinces of Kratie, Stung Treng, Rattanakiri and Kompong Cham (Urbani et al., 2002), over 1300 individuals were investigated using the Kato-Katz method (WHO, 1980) during household surveys and over 1200 during school surveys (Stich et al., 1999), and 12 villages were screened using

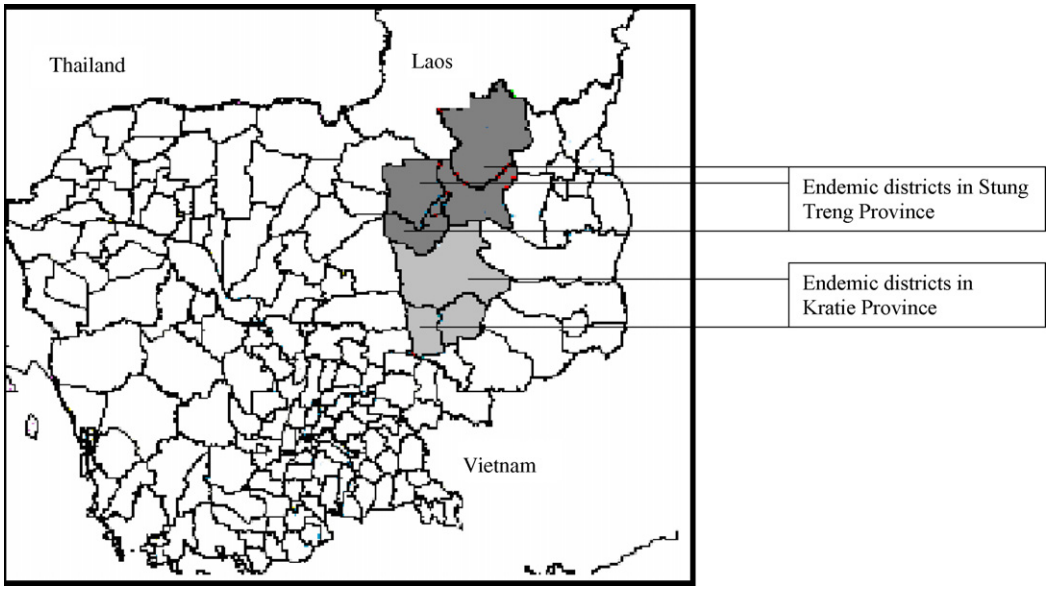

Figure 1 Location of districts endemic for *Schistosoma mekongi* in Cambodia.