IMPORTANT TREMATODES IN MAN IN INDONESIA

A review

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ABSTRACT

Trematode infections are considered to be a non public health problem in Indonesia, with the exception of the two species namely *Schistosoma japonicum* and *Fasciolopsis buski* which are still assumed to be the most important trematodes of Indonesia. Other trematode infections reported occasionally were caused by: Echinostoma spp, *Haplorchis yokogawai, Haplorchis taichui, Paralecithodendrium molenkampi, Phaneropsolus bonnei* and *Plachiorchis javensis.*

Schistosoma japonicum infection has been known to be endemic among the inhabitants of Lake Lindu since 1937. Surveys carried out since that time revealed prevalence rates which varied from 8-55%. Further studies proved that the species at Lindu were similar to the species found in Asia. Resurvey initiated in 1971 gave almost a similar prevalence rate followed by the discovery of the molluscan intermediate host namely *Oncomelania hupensis lindoensis.*

In 1972 a new focus of schistosomiasis was discovered at Napu Valley. Other survey did not reveal any other endemic foci. The result of a biological study carried out since 1976 reconfirmed the diagnosis of the species. Clinical study showed that the significant signs and symptoms of schistosomiasis found among the Lindu inhabitants were : dermatitis, diarrhea, dysentry, abdominal pain, nausea and vomiting, loss of appetite, weakness, distention of the abdomen, melaena, hepatomegaly and splenomegaly.

Control of schistosomiasis was initiated in 1981, using praziquantel for mass treatment. Twelve cycles of treatment at Lake Lindu area and 10 cycles at Napu Valley resulted in a reduction of overall prevalence rate from 15,80 % at Lindu area in 1981 to 1,14 % in 1987 whereas in Napu Valley the reduction was from 35,8 % in 1982 to 1,00 % in 1987.

Fasciolopsis buski infection was first reported in 1982 from the Regency of Babirik, Hulu Sungai Utara in South Kalimantan Province. The following survey in that area in 1986 revealed a prevalence rate of 27,0 %. Clinical examination showed that some of the complaints were : diarrhea, poor appetite, mild abdominal colic or burning sensation, vomiting and fever. Physical examination revealed emaciation, anemia, distented abdomen, ascites, and jaundice. Another survey in four other adjacent villages showed prevalence rates that varied from 0,00% - 68,3%. The epidemiological survey carried out recently did not reveal the intermediate hosts except only two metacercariae which could not be identified.

INTRODUCTION

Trematode infection is considered to be a non public health problem in Indonesia, with the exception of the two species namely *Schistosoma japonicum* and *Fasciolopsis buski* which are still assumed as the most important trematodes in man in Indonesia. On the other hand there were some cases of trematode infections which were reported occasionally as case reports such as : Echinostoma spp., *Haplorchis yokogawai,*

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Haplorchis taichui, Paralecithodendrium molenkampi, Phaneropsolus bonnei and *Plagiorchis javensis.*

Schistosoma japonicum infection is found endemic among the inhabitants of Lake Lindu area and Napu Valley, Central Sulawesi, and *Fasciolopsis buski* is found among the inhabitants of Sei Papuyu village South Kalimantan Province.

In this paper, a brief description of the two most important species will be given as follows :

I. *Schistosoma japonicum*

Schistosomiasis was first reported in 1937 following the discovery of a case in Palu, Central Sulawesi[1]. The patient was a 35 year old male from Tomado village in the lake Lindu area. In the same year Brug and Tesch[2] identified the eggs of *S. japonicum* in tissue sections taken at autopsy from the same patient. Based on this finding, a stool survey was conducted in that area, and *S.japonicum* eggs were found in 8 % of stool examined by direct smear method. In 1940 Bonne and Sandground[3] resurveyed the area and found a prevalence rate of 55 % for *S.japonicum*. In 1942 Bonne et al.[4] found adult schistosomes in human, dogs and wild deer which they considered closely related to the classical form of *S.japonicum*. In 1948 Faust and Bonne[5] described the morphology of the adult schistosomes and identified them to be similar to the Asian *S.japonicum*. Buck and Uhrmann[6] resurveyed the Lindu Lake area and found *S.japonicum* infections in 26 % of the population sampled.

Resurvey carried out 34 years after the first survey showed a 53 % prevalence rate of *S.japonicum* infection[7]. Gunning et al.[8] conducted a very superficial clinical study without further identification of the positive signs and symptoms of schistosomiasis found in the Lindu area. After that a new focus of schistosomiasis was found in Napu Valley, about 50 km southeast from Lindu valley[9].

Stool surveys in other areas of Sulawesi conducted between 1972 and 1978 did not reveal any other areas of schistosomiasis transmissions.[9,10,11,12,13,14,15,16]

Intensive molluscan surveys carried out by Bonne, et al.[4] failed to find the intermediate host of *S.japonicum* in the Lindu Valley. A cursory molluscan survey of the Lindu area in 1971 yielded only one specimen of *Oncomelania hupensis*[17], which was described as a new species, namely *Oncomelania hupensis lindoensis*[18]. The finding of this new subspecies snail led to the discovery of the first focus of *O. hupensis lindoensis* in the Palu rice-field area reported by Hadidjaja et al.[19]. Dazo, et al.[20] initiated several schistosomiasis studies in Lindu Valley to determine some baseline data on the epidemiology, especially on the snail intermediate host, as well as the reservoir hosts. Also a pilot control project was introduced mainly on the modification of the environment, snail control as well as treatment trial in Anca village using niridazole and stibofen[21].

Since 1981, mass treatment with praziquantel (Bayer & Merck Darmstadt) was carried out in Lindu lake area, and was followed later by Napu valley.

This mass treatment was carried out by the Center for Communicable Disease Control, with a dosage schedule of 30 mg per kg body weight given twice daily for one day, resulting in a drastic decrease of prevalence rate up to about 2.5 %.

LABORATORY AND CLINICAL STUDIES

Laboratory studies which consisted of the study on the life cycle of the parasite as well as the snail culture revealed that the morphology of the *Schistosoma japonicum* Lindu strain was similar to that of the classical *Schistosoma japonicum* found in Asia[22].

SNAIL CULTURE

A modified method of snail culture was developed in 1976 using a combination of De Witt[23] and Lewert[24] methods. A simulation of one of the snail habitats in Lindu area was applied. This modified method of culture was efficient and proved successful.

FIELD STUDIES

A clinical study was carried out in Langko and Owo village, two villages in the lake Lindu area in 1976. The clinical study consisted of clinical evaluation of signs and symptoms of schistosomiasis. Stool and COPT (Circumoval Precipitin Test) examinations were done mainly for the purpose of finding effective methods in mass surveys.

The results of the clinical study showed that dermatitis, diarrhea, dysentry, abdominal pain, nausea and vomiting, loss of appetite, weakness, short of breath, distention of the abdomen, melena, hepatomegaly and splenomegaly were found significantly different between the frequencies in schistosomiasis cases and those of the control group.

The liver rate was 27.1 %. The highest was found in the age group of 50 years and over. The average palpable liver was 0.93. The spleen rate was 26.8 %, and the highest was found in the 10-19 year age group. The average palpable spleen was 0.95.

The result of stool examination showed that from the 425 stool samples examined, 308 stools were found positive with *Schistosoma* eggs, whereas the result of examination of 425 sera for COPT showed that 306 samples were positive.

CONTROL OF SCHISTOSOMIASIS

Intensive control measures were initiated in 1981, using praziquantel (Bayer-Merck Darmstadt) as a drug of choice for the mass treatment of schistosomiasis in Lake Lindu area and Napu Valley. The dosage applied was 30 mg per kg bodyweight given twice daily for one day; this mass treatment was carried out once every 6 months. Other additional control measures were also applied such as snail control, provision of clean water and latrines as well as health education and environmental improvement.

The overall prevalence rate of schistosomiasis in Lake Lindu area was 15.8 % in 1981 and in Napu 35.8 % (1982). In 1981 a total of 63 snail foci were found in Lake Lindu area, whereas in Napu Valley there were 74 foci found in 1982. The snail infection rate was 0.38 in Lindu Valley (1982) while in Napu Valley the snail infection rate was 1.7 (1982). The infection rate of rats in Lindu Valley was found to be as high as 2.44 % (1984) and in Napu Valley 11.9 % (1983). Up till 1987 mass treatment of schistosomiasis has been executed for 12 cycles in Lindu area and 10 cycles in Napu Valley.

The data of pre- and post-intervention is given in Table 1.

Table 1. The overall data of schistosomiasis in Lake Lindu area and Napu Valley before and after intervention

Indicators	Before		After	
	Lindu	Napu	Lindu	Napu
Prevalence in human	15.80%	35.80%	1.14%	1.00%
No.snail foci	63	74	6	64
Infection rate of snails	0.38%	1.70%	1.14%	1.80%
Infection rate of rats	2.44%	11.90%	0.00%	13.20%

II. *Fasciolopsis buski*

Fasciolopsis buski is known to infect man in Indonesia, whereas *Fasciola* spp. infection is found only in cattle. The first autochthonus case of fasciolopsiasis was reported by Hadidjaja et al.[25] and was found in an 11 year old boy who has been living since birth in the regency of Babirik, Hulu Sungai Utara Province in South Kalimantan. A total of seven worms were vomited by this boy. The morphology of the worms were typical for *Fasciolopsis buski*.

A survey on human fasciolopsiasis was carried out in the village of Sei Papuyu in Babirik subdistrict, Hulu Sungai Utara Regency, South Kalimantan Province[26]. Mass fecal samples were collected from the inhabitants including children from the primary schools. The fecal samples were then examined by the direct smear method, and those children who showed positive *Fasciolopsis buski* eggs in their stool were then treated with praziquantel with a total dose of 30 mg/kg body weight, divided into 2 doses. Faecal samples were re-examined 24 hours after treatment.

A total of 548 samples were examined. The result showed that 27.0% of the stools were positive with *Fasciolopsis buski* eggs. The clinical history showed that some of the complaints were diarrhoea, poor appetite, mild abdominal colic or burning sensation, abdominal discomfort, vomiting and fever. Physical examination revealed emaciation, anemia, distended abdomen, ascites and jaundice in a small number of individuals. Praziquantel treatment yielded an average of 22 worms in each of the 4 fecal specimens examined.

In 1986 a resurvey of fasciolopsis was carried out in four of the adjacent villages of Sei papuyu village, Babirik subdistrict, in South Kalimantan Province[27]. Also faecal examination and praziquantel treatment of positive cases as well as clinical examination were done; this time the dosage used was higher : 60 mg/kg body weight. The result showed that the prevalence rate of 580 fecal samples examined from the 4 villages, varied from 0.0 % - 68.3%, with a mean prevalence of 18.3 %. The positive rate in children was

25.8%; clinical examination was done in 112 children infected with *Fasciolopsis*, and the result was similar to those seen in school children at Sei Papuyu village.

DISCUSSION AND SUMMARY

It is apparent from this review that trematoda infections except *S.japonicum* and *F.buski* are rarely reported in Indonesia. This may be due to the fact that eating habits and customs of the Indonesian people prevented them from getting the infection. In Indonesia people usually consume well-cooked food which resulted in the death of the infective metacercariae.

As reported by Lie[28], in special instances rare trematodes could be found at autopsy of some members from the Lenteng Agung Colony For The Insanes. Lie observed that those insanes usually ate everything which was edible, such as earth worms, dragonfly larvae, snails etc., and these might contain infective larvae of trematodes, which contributed to trematode infections. This evidence may explain why *Haplorchis, Echinostoma, Plachiorchis, Paralecithodendrium*, and *Phaneropsolus* could be found at autopsy.

On the other hand, *S.japonicum* infection seems to exist in Lindu Lake area long before this endemic focus was discovered in 1937.[2] Since the discovery of this first focus of *S.japonicum* in the Lake Lindu area, successive investigations were carried out. These indicate that *S.japonicum* infection seems to be an important trematode which is considered as a public health problem in the endemic area in Central Sulawesi. Beginning in 1981, control measures were taken, mostly emphasized on program of mass treatment with praziquantel. In addition also snail control as well as improvement of environmental sanitation, health education were applied, namely in Lindu and Napu Valley. These control measures resulted in a drastic decrease of the overall prevalence rate in Lindu as well as in Napu Valley, to about 1% in 1987.

Concerning *Echinostoma*, some cases of human infection with *E.ilocanum, E.recurvatum, E.revolutum* were reported to be found in the neighbourhood of Jakarta. There exists the source of infection of these worms, including *E.malayanum* in the form of metacercariae in the snails *Viviparus javanica* and *Pila scutata*. These snails are consumed by the people, mostly in a well-cooked condition. So infection only occur when the metacercariae escape the boiling process and remain alive to infect human. This is the reason why human infections are rare, except in special occasions such as among lunatics at Lenteng Agung Colony For The Insanes.

Fasciolopsis buski infection in human in Indonesia was first reported in 1982 by Hadidjaja et al.[25] in an 11 year old boy. After the discovery of the first case, a survey to Sei Papuyu village revealed a prevalence rate of *F.buski* infection among the inhabitants of that village as high as 27.0 % and mostly in schoolchildren, and this might be due to the fact that those children have the habit of eating pods of white water-lotus and probably other water-plants which are found prevalent in the swampy areas or rivers which are found around the villages. At the time of the second survey, no attempt was made to examine the water-plants for the existance of the metacercariae, and the result of fresh-water snail examinations such as Pila, Planorbis, Lymneae and Gyraulus was negative. The latest survey carried out in 1988 revealed only 2 suspected metacercariae (Handoyo, et al. personal communication). It seems that it is not so easy to

find the metacercariae which are attached to the water-plants. With that small number of metacercariae, experimental infection in rabbits to confirm the diagnosis is hardly impossible.

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QUESTIONS AND ANSWERS :

1. Question: What is the status of Schistosoma incognitum in Indonesia ?
   Do you consider it to be a potential health problem where it is endemic ?

   Answer : Schistosoma incognitum is only found in animal, especially in rats. From our study of Rattus species we found about 30% of the *Rattus argentiventer* were positive with *S.incognitum*.
   I do not think that it is a potential health problem in endemic areas.

2. Question: Has the human re-infection rate to Schistosoma been determined ?
   What is the source of *F.buski* infection.
   Have adult *F.buski* been found ?

   Answer :
   - No, human re-infection rate for Schistosoma has not been determined.
     But I am sure that re-infection still exists due to the presence of reservoir hosts namely rice-field rats and wild rats.
   - The source of *F.buski* infection is probably the pods of water lotus. Adult worms were collected from the first case as well as from the treated case.