EPIDEMIOLOGY OF OPISTHORCHIASIS AND NATIONAL CONTROL PROGRAM IN THAILAND

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Abstract. Opisthorchiasis is a disease caused by opisthorchis trematode commonly known as liver fluke. In Thailand *Opisthorchis viverrini* is the only parasite of opisthorchiasis. the first case of opisthorchiasis was reported in 1911 by Leiper from the autopsy of corpse in Chiang Mai. Later on Sadun in 1953, Harinasuta and Vajjarasthira in 1961, and Wykoff in 1965 had demonstrated a complete life cycle of *O. viverrini.*

History of opisthorchiasis control has dated back to 1950 as a small scale helminthiosis control program in some high risk areas. Following a number of studies and trial projects of the Faculty of Tropical Medicine of Mahidol University, the national liver fluke control program has been developed and operated under different National Public Health Development Plans. Presently, the program is being operated in some central provinces, and all northeastern and northern provinces of Thailand.

The main strategies for liver fluke control are comprised of 3 interrelated approaches, namely stool examination and treatment of positive cases with praziquantel for eliminating human host reservoir; health education for a promotion of cooked fish consumption for preventing infection; and the improvement of hygienic defecation for transmission interruption.

Data obtained from liver fluke control operation in 1996 show the countrywide prevalence of opisthorchiasis at 21.5% with a variation in all age groups. Differences of infection are also found among geographical regions. A large percentage of infection is mild infection. Comparing figures of 1981 and 1991, there is a considerable increase in the central and northern regions, while the northeastern region has significant decrease.

INTRODUCTION

Opisthorchiasis is a disease caused by *Opisthorchis* trematode commonly known as liver fluke. In Thailand, liver fluke infection has been recognized as the major local public health problem in northeastern region of the country for more than forty years. Its high prevalence with chronic infection contributes to a development of liver cirrhosis and a prevalence of cholangiocarcinoma among the rural northeastern peasantry.

In 1992, the first case of opisthorchiasis in Thailand was reported by Leiper from an autopsy of corpse in Chiang Mai. Later, Sadun in 1953, Harinasuta and Vajrasthira in 1961, and Wykoff in 1965 had demonstrated a complete life cycle of *Opisthorchis viverrini.*

Opisthorchis viverrini trematode definitive hosts other than human are cat, dog, and other fish eating animals. The first intermediate hosts are snails *Bithynia.* The second intermediate hosts are numerous species of cyprinidae fishes. The egg hatches when ingested by a snail. The cercariae leave the snail in about 2 months encysted in the fresh of cyprinidae species fish, and become infective metacercariae. When ingested by a definitive host, they excyst in the duodenum and pass to the distal bile ducts, where they reach maturity in 3-4 weeks.

Figures obtained from epidemiological surveys during the past 30 years indicated the increase of infection in northeastern region of Thailand. Its prevalence was 25% in 1953 and 29.80% in 1957. Later in 1981 the prevalence went up to 34.6%.

HISTORY OF OPISTHORCHIASIS CONTROL IN THAILAND

During 1950-1958, The Department of Health had organized intestinal helminthiasis control units in 5 provinces, namely Nakhon Ratchasima, Udon Thani, Sakon Nakhon, Ubon Ratchathani and Songkhla. The units were operated under the support of the US government. Services provided by the control units covered the diagnosis and treat-

ment of intestinal parasites and liver fluke. Following the termination of US aid in 1958, the helminthiasis control units were dissolved while its activities still continued. Later on the parasite control program was integrated into rural health development project of Health Development Division. Helminthiasis Control was one element of village health Development at that time. Stool examination prior to and after health development in each village was the main strategy.

From 1967 to 1974, a liver fluke control unit was established at Sakon Nakhon province on the trial operation scale. Control activities were emphasized on community health education with a variety of approaches strategy such as, a cooked fish dish demonstration; a provision of low cost cooking pot etc. After the discontinuation of the liver fluke control trial unit in 1974, extensive health education approach was the only measure for the control of opisthorchiasis.

In 1980, studies done at the Faculty of Tropical Medicine, Mahidol University indicated that a single dose of 40 mg praziquantel per 1 kg body weight had its cure rate for liver fluke as high as 91%. This finding had tremendous significance to the control of liver fluke infection in a later period.

Following the initial finding, a joint field trial between the said institution and the Helminthiasis Section of the Department of Communicable Disease Control conducted the field operation study in northeastern area during 1980-1983. The results had demonstrated that the cure rate of a single dose praziquantel for liver fluke was as high as 95.5%.

During 1983-1987, the Department of Communicable Disease Control organized 4 liver fluke treatment units in the northeast, located in Khon Kaen; Roi Et, Sakon Nakhon and Ubon Ratchathani provinces. It provided stool examination service for 629,522 cases and treatment of liver fluke for 400,452 positive cases.

NATIONAL OPISTHORCHIASIS CONTROL PROGRAM

The significant development of liver fluke control operations on a regionwide scale started in 1987 when liver fluke control program was included in the sixth 5 -Years National Public Health Development Plan (1987-1991). According to the plan all existing health facilities in northeastern region would be responsible for liver fluke diagnosis and treatment under technical support and supplies of the Department of Communicable Disease Control including training evaluation. It was reported that 5,238,062 cases had their stools examined, and 1,774,929 positive cases were treated.

In addition to the regular program, the Federal Republic of Germany government provided technical support and partial operational support through the established project on the Promotion of Community Health through Parasite Control in 7 northeastern provinces covering approximately three million population over 3 years period (1989-1992). It was reported that 1,839,813 cases received stool examination and 531,175 positive cases were treated.

Following the expansion of liver fluke control program to all provinces of the northern region and some provinces in the central region in 1992, the program has its coverage up to 42 provinces.

Up to present, liver fluke control program remains in the eighth 5-year National Public Health Development Plan where as control activities are integrated into comprehensive rural health service of all target provinces basing on the concept of better targeting operation control. The degree and extent of activities vary on situation of the problem and priorities given by each province.

STRATEGIC APPROACHES FOR LIVER FLUKE CONTROL

The main strategies for liver fluke control are comprised of 3 interrelated approaches. They are, stool examination and treatment of positive cases with praziquantel for eliminating human host reservoir; health education aiming at a promotion of cooked fish consumption for interrupting infection of liver fluke; environmental sanitation development to improve hygienic defecation for interrupting disease transmission.

Crucial activities designated for the control strategies include the following elements.

- The organizing of mobile stool examination team.
- Community preparation through mobilizing of individual, family and community participation.
- Continuing effective health education.

Ideally, in each area stool examination service is provided once a year by collecting stool boxes from each household with a ten baht per case contribution as a stool examination fee. All positive cases are treated with single dose praziquantel with a contribution of 10 baht per one case. These activities have to be carried out for 2-3 consecutive years with a coverage of at least 60% for each round. Whenever the situation of prevalence in any area go down below 10%, the active services are then gradualy switched to the passive services where health facilities in the area provide stool examination and treatment on the basis of passive case detection (Fig 1).

Recently, some degree of reinfection has been recognized. The regionwide situation needs to be assessed every 2-3 years. Information obtained would indicate need for maintaining and sustaining activities in focus areas. This will safeguard a recurrence of this problem in the prospect.

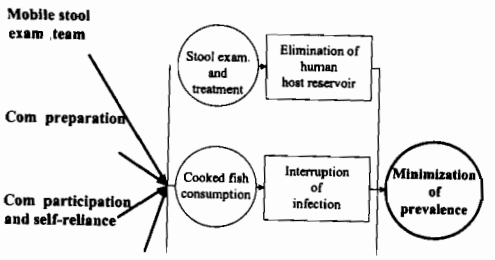


Fig 1–Conceptual frame of liver fluke control.

Table 1

Prevalence of opisthorchiasis in Thailand in 1996 identified by Kato's thick smear technic of stool examination by age group.

Age group	Prevalence rate (%)
0-4	4.3
5-9	2.7
10-14	4.2
15-19	16.3
20-29	25.6
30-39	22.2
40-49	27.2
50-59	24.6
60 and over	24.0
Total	21.5

Source : Meesomboon and Jongsuksuntigul (1997).

Based on figures obtained from countrywide evaluation of liver fluke control in 1996, the prevalence of opisthorchiasis is 21.5 %. The variation of infection is lowest among 0-14 years age group population while the highest prevalence rate is among population aged 40-49 years which is as high as 27.2 %.

The increase of prevalence among risk population groups has a positive relationship with the increase of age. This could be explained by the fact that liver fluke once infected in any individual remains viable and reproductive for several years as long as infected person remains untreated. (Table 1)

Distribution of opisthorchiasis is not homogenous throughout the country. It vary from one region to region. The latest data obtained from the liver fluke control evaluation in 1996 indicated the highest prevalence (32.6%) in the northern region. While the central region has its prevalence rate of 16.7%. The lowest is 15.3 % of the northeastern region (Table 2)

Table 2

Distribution of opisthorchiasis prevalence in 1996 by region.

Region	Prevalence rate (%)
Central	16.7
North	32.6
Northeast	15.3
Total	21.5

Source : Meesomboon and Jongsuksuntigul (1997).

Within the same region, there is also variation in its prevalence among different subregions. According to the Department of Communicable Disease Control administrative region (CDC Region), prevalences of liver fluke infection in 1996 in each region are considerably different. It vary from 12.0% in CDC Region 5 in the northeast to 43% in CDC Region 10 in the north (Table 3).

Table 3

Prevalences of opisthorchiasis in 1996 by CDC Region.

CDC region	Prevalence rate (%)
Central :	
CDC Region 2	15.8
CDC Region 3	18.3
Northeast :	
CDC Region 5	12.0
CDC Region 6	20.6
CDC Region 7	12.8
North :	
CDC Region 8	25.4
CDC Region 9	24.9
CDC Region 10	43.0
Total	21.5

Source : Meesomboon and Jongsuksuntigul (1997).

group(1,330). Intensity among different age groups provides strong evidence of inclining trend of liver fluke infection among the older age population (Table 4).

Some variations in liver fluke infection intensity are found among different regions. The obvious one is in the north where the percentage of moderate and heavy infection are higher than those in the central and the northeast (Table 5).

Based on a chronological basis, prevalence of opisthorchiasis in all regions of Thailand has increased. When looking at region by region, it is evident that the prevalence in the northeastern region has declined. From the countrywide picture, the prevalence rate has increased from 14.7% in 1981 to 21.5% in 1996. In the north, the prevalence rate has increased from 5.6% in 1981 to 32.6% in 1996. The prevalence rate of liver fluke infection in the central region has also been increased from 6.3% in 1981 to 16.7% in 1996. The northeast is the sole region that its liver fluke infection prevalence has dropped from 34.6% in 1981 to 15.3 in 1996 (Fig 2).

Table 4

Intensity of opisthorchiasis in Thailand in 1996 by age group.

Age group	MEPG	Percentage of infected individuals by MEPG		
		<1,000	1,000-9,999	10,000 and over
0-4	312.8	100.0	0	0
5-9	835.4	85.7	14.3	0
10-14	296.4	100.0	0	0
15-19	336.7	86.4	13.6	0
20-29	999.9	91.2	7.0	1.8
30-39	489.9	88.1	10.2	1.7
40-49	874.9	79.8	19.0	1.2
50-59	1,330.6	82.8	14.1	3.1
60 and over	977.2	91.2	5.9	2.9
Total	876.3	86.7	11.7	1.9

Source : Meesomboon and Jongsuksuntigul (1997).

As intensity of liver fluke infection has its significance for opisthorchiasis control. It signifies the degree of repeated infection and transmission of disease in the area. Figures obtained from the 1996 liver fluke control evaluation show the mean egg count per 1 gram of feces (MEPG) in all age groups for 876. The lowest MEPG is of 10-14 age group (296) while the highest MEPG is of 50-59 age

DISCUSSION

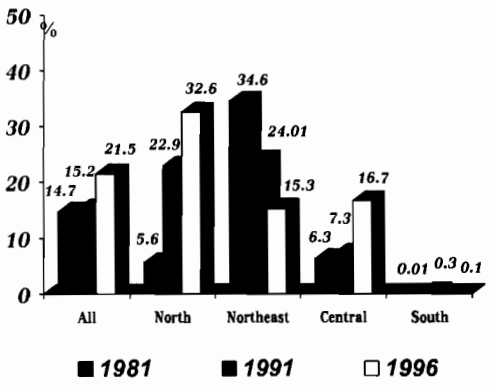
The impact of opisthorchiasis control operation over ten years in the northeast has been demonstrated by a number of appraisals. A significant decrease of infection is markedly observed. However, raw data obtained from a number of

Table 5

Intensity of opisthorchiasis infection in Thailand in 1996 by region.

Age group	MEPG	Percentage of infected individuals by MEPG		
		<1,000	1,000-9,999	10,000 and over
Central	1,034.6	87.8	10.9	1.4
North	1,226.4	80.9	14.9	4.1
Northeast	268.5	91.7	8.3	0
Total	876.3	86.7	11.4	1.9

Source : Meesomboon and Jongsuksuntigul (1997).



Source : Division of General Communicable Diseases, Department of Communicable Disease Control

Fig 2–Comparison of opisthorchiasis prevalence in Thailand in 1981, 1991 and 1996 by region.

clusters througout the region indicates fairly large variation from one cluster to another cluster. Some areas have much lower positive rates while some other areas remain considerably high . It is speculated that not all areas have that prevalence. Detailed analysis of evaluation will provide substantial answers for this speculation. Strongly recommended that intensive liver fluke control activities have to be strengthened in certain communities on the basis of better targeting approach.

Figures presently obtained show considerable increase of liver fluke infection in some age groups particularly the younger population. This is a warning sign for continuing control efforts in high risk focus group.

When the overall situation of opisthorchiasis is lower, people seem to have less awareness of infection, consumption of risk food is easily recurrent. Hence, a high degree of reinfection would be anticipated. Continuing health education to sustain positive health behavior has to be seriously considered.

It has been suspected that a high prevalence liver fluke infection in the north is truely due to *O. viverrini* or some other intestinal flukes. Some investigations have already been carried out in the area. Results obtained are still pending.

From the administrative and managerial point of view, the strong support of the country in terms of policy and sufficient budget allocation is critical factors for the continuance and maintenance of *opisthorchis* control program at a desired level.

Appropriate plan of operation and active actions have to be carried out at the peripheral level where the problem do exist.

Primary health care infrastructure in all target areas has to facilitate liver fluke control to the greater extent. The emphasis has to be given to a high coverage of hygienic defecation and a sustainable consumption of cooked fish dishes among risk population in target areas.

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