

THE CORRELATION BETWEEN RAINFALL AND THE PREVALENCE OF TREMATODE METACERCARIA IN FRESHWATER FISH IN THAILAND

Viroj Wiwanitkit

Department of Laboratory Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand

Abstract. The author performed a retrospective study on 5 complete reports with geographical data and the prevalence of metacercariae in Thailand. The relation between rainfall (derived from the geographical data) and the prevalence of metacercariae in freshwater fish (derived from the overall infection rate of metacercaria) was investigated. The least-square equation plot rainfall (y) versus prevalence (x) is $y = 12.4x + 43.8$ ($r = 0.858$; $p < 0.05$). A significant correlation was discerned between rainfall and the prevalence of freshwater fish infection. According to these previous studies, the prevalence of freshwater fish infection may depend on rainfall. Predicted prevalence of freshwater fish infection as a GIS figure was also presented.

INTRODUCTION

Fish-borne trematode infection is a parasitic zoonosis with a great variety of clinical manifestations. The infections are quite common in Southeast Asia including Thailand (Radomyos *et al*, 1998). Generally, humans are infected by consumption of metacercariae in infected hosts in the form of partially cooked or uncooked food (Wiwanitkit *et al*, 2001). Wiwanitkit *et al* (2001) recently proposed that several Thai cooking practices cannot effectively destroy metacercaria and can be the main risk to consumers.

Human infections with these parasites are common in Thailand. Surveys of the contamination of trematode metacercaria in freshwater fish are useful for prevention and control of diseases (WHO, 1995) and have been continuously performed in Thailand. Here, the relation between rainfall and the prevalence of trematode metacercaria in freshwater fish was investigated.

MATERIALS AND METHODS

This study was designed as a descriptive retrospective study. The author performed a literature review on surveys of the contamination of trematode metacercariae in freshwater fish in Thailand from a database of the published works cited in the PubMed, MEDLINE, CAB Health Database, Science Citation Index and Thai Index Medicus. As a result of the literature review, 5

reports were recruited for further study.

Data of rainfall distribution of Thailand were derived from the Royal Irrigation Department, Thailand. Average yearly rainfall distribution images of Thailand as GIS picture created by High Performance Computing Center / NECTEC Thailand was used as primary data.

The geographical data and the overall infection rate of trematode metacercariae in all included reports were studied. Rainfall was derived from the geographical data while the prevalence of trematode metacercaria in freshwater fishes was derived from the overall infection rate of trematode metacercariae. Regression analysis was used for determining the correlation between rainfall and the prevalence of trematode metacercariae in freshwater fish. The least-square equation plot rainfall (y) versus prevalence (x) and the correlation coefficient (r) were calculated. All of the statistical analyses in this study were made using SPSS 7.0 for Windows.

RESULTS

There have been 5 reports (Namue *et al*, 1998; Wongsawad *et al*, 2000; Mard-arhin *et al*, 2001; Saenphet *et al*, 2001; Nithiuthai *et al*, 2002) on cross-sectional surveys with geographical data and the prevalence of trematode metacercariae in Thailand. The reported prevalence ranged from 19.1% (Wongsawad *et al*, 2000) to 43.0% (Nithiuthai *et al*, 2002). The relation between rainfall and the prevalence of trematode metacercaria in freshwater fish is shown in Fig 1. The least-square equation plot rainfall (y) versus prevalence (x) is $y = 12.4x + 43.8$ ($r = 0.858$; $p < 0.05$). The predicted prevalence of freshwater fish infection is shown in Fig 2.

Correspondence: Viroj Wiwanitkit, Department of Laboratory Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand. E-mail: viroj.w@chula.ac.th

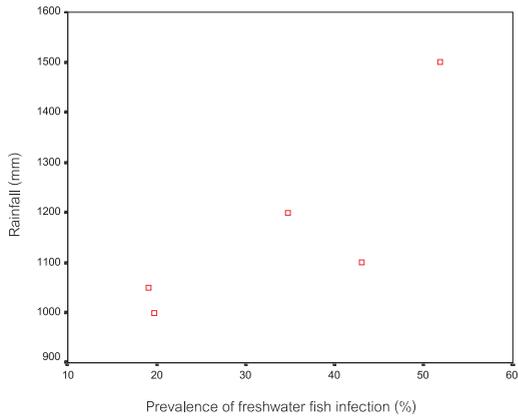


Fig 1- Scatterplot between rainfall and the prevalence of trematode metacercaria in freshwater fish.



Fig 2- Predicted prevalence of freshwater fish infection. This figure is derived from Fig 1. The least - square equation plot rainfall (y) versus prevalence (x) is $y = 12.4x + 43.8$.

DISCUSSION

In 1968, Lee (1968) stated that parasitic infection in freshwater fish might correlate to the season. Saksirisampant *et al* (2002) recently mentioned the possible effect of rainfall on the prevalence of eel infection. According to this study, a significant correlation was discerned between rainfall and the prevalence of freshwater fish infection (Fig 1). A high prevalence of freshwater fish infection is found in many areas of northeastern, eastern and southern Thailand (Fig 2). This study confirms the effect of rainfall on the prevalence of trematode metacercaria in freshwater fish; infection prevalence correlated significantly with rainfall. Therefore, constant surveys of trematode metacercaria contamination and control of consumption of freshwater fish during the heavy rainfall period are recommended. However, this study focused on only 5 surveys in Thailand; further similar studies in other countries to assess the correlation between rainfall and the prevalence of infection is required to substantiate this conclusion. In addition, the effects of other possible confounding factors, including seasonal variation and geographical habitat of the freshwater fish, should be considered.

REFERENCES

- Lee JT. Studies on the metacercariae from freshwater fishes in the Kum-Ho River. *Kisaengchunghak Capchi* 1968;677-79.
- Mard-arhin N, Prawang T, Wongsawad C. Helminths of freshwater animals from five provinces in northern Thailand. *Southeast Asian J Trop Med Public Health* 2001;32 (suppl 2):206-9.
- Namue C, Rojanapaibul A, Wongsawad C. Occurrence of two heterophyid metacercariae *Haplorchis* and *Haplorchoides* in cyprinoid fish of some districts in Chiang Mai and Lumphun Province. *Southeast Asian J Trop Med Public Health* 1998;29:401-5.
- Nithiuthai S, Suwansaksri J, Wiwanitkit V, Chaengphukeaw P. A survey of metacercariae in cyprinoid fish in Nakhon Ratchasima, northeast Thailand. *Southeast Asian J Trop Med Public Health* 2002;33 (suppl 3):103-5.
- Radomyos B, Wongsaraj T, Wilairatana P, *et al*. *Opisthorchis* and intestinal fluke infections in northern Thailand. *Southeast Asian J Trop Med Public Health* 1998;34:1119-20.
- Saksirisampant W, Kulkaew K, Nuchprayoon S, Yentakham S, Wiwanitkit V. A survey of the infective larvae of *Gnathostoma spinigerum* in

- swamp eels bought in a local market in Bangkok, Thailand. *Ann Trop Med Parasitol* 2002;96:191-5.
- Saenphet S, Wongsawad C, Saenphet K. A survey of helminths in freshwater animals from some areas in Chiang Mai. *Southeast Asian J Trop Med Public Health* 2001;32 (suppl 2):210-3.
- Wiwanitkit V, Nithiuthai S, Suwansaksri J, Tangwattakanont K, Chongboonprasert C. Viability of minute intestinal fluke, *Heterophyidae* spp, metacercariae in fish dishes prepared by different uncooked methods. *Ann Trop Med Parasitol* 2001;95:725-7.
- Wongsawad C, Rojanapaibul A, Mrad-arhin N, *et al.* Metacercaria from freshwater fishes of Mae Sa stream, Chiang Mai, Thailand. *Southeast Asian J Trop Med Public Health* 2000;31 (suppl 1):54-7.
- World Health Organization. Control of foodborne trematode infections. Report of a WHO study group. *WHO Tech Rep Ser* 1995;849:157.