

## STUDY REPORTS

2. Title: Clinical Manifestations and Epidemiological Studies of Eosinophilic Meningoencephalitis in Man

Principal Investigator: Major Sompone Punyagupta, MC, RTA

Associate Investigators: Major Pipat Juttijudata, MC, RTA  
Dr. Thanongsak Bunnag  
Captain Sylvanus W. Nye, USAF(MC)  
Lt Colonel Edward H. Johnston, MC

## OBJECTIVE

To do complete epidemiological, clinical and laboratory examinations on cases of Eosinophilic Meningoencephalitis in Thai subjects and perform such special animal investigations as are indicated. The incidence and the public health aspect of eosinophilic meningoencephalitis are carefully evaluated aspects of the study. Based on the completed studies in the South Pacific areas, and preliminary investigations made by the principal investigator in Thailand, it would suggest that the disease, Eosinophilic Meningoencephalitis, may be an important public health problem involving both Thai civilian and military personnel. An earlier study performed in Bangkok covering the years 1961 to 1964, revealed a total of 60 cases of Eosinophilic Meningoencephalitis diagnosed in the records of 10 local hospitals.

DESCRIPTION: To establish incidence, seasonal variation, clinical symptoms and the pathology of this parasitic disease, clinical surveys were done in many provinces periodically throughout the year. Every suspected case was to be confirmed by lumbar puncture. In every positive case, a complete epidemiology evaluation was to be attempted. In all fatal cases, efforts were made to obtain autopsies in order to study the pathological changes in the central nervous system. Research studies in the laboratory were to evolve around the careful evaluation of Pila snails as well as fresh water fish and shrimps and the finding of positive larvae used to establish the source of the human infection. Experimental animal studies were to be directed toward infecting a definitive host (rat) and an unsuitable host (guinea pig) using the local strain as well as the Honolulu strain of A. cantonensis. The pathology produced in the brain and spinal cord of these animals was to be studied.

PROGRESS: A total of 345 human cases were diagnosed as Eosinophilic Meningitis. Seven hundred seventy-five lumbar punctures were performed. The typical syndrome of Eosinophilic Meningitis was found in 308 cases, while 37 cases also had signs of Myeloencephalitis. There were twice as many males as females in this series. The 21 to 40 age group showed the largest number of cases. There were 14 cases diagnosed in military personnel.

Deaths occurred in 8 cases and 4 were autopsied. In none of the cases was a worm found in the brain or spinal cord. Mortality was high in the Myeloencephalitic type but rare in the meningitic type.

Three clinical manifestations of Eosinophilic Meningitis were first recognized by this study, namely: limb paralysis as seen in transverse myelitis, cerebral hemorrhage and impairment of vision. Facial paralysis and lateral rectus eye muscle paralysis were recorded in 5.5 and 2.6% respectively. Visual impairment was present 15%. Fundoscopic examination in these cases showed blurring of the optic disc in one or both eyes.

The cases with Myeloencephalitis (mainly from the Ubol and Prachinburi areas) had a unique symptom complex consisting of severe agonizing pain in the trunk and limbs for a few days followed by paralysis of the extremities. (Table I shows major and minor manifestations of the disease in 266 cases).

Eosinophilic Meningoencephalitis has been found in 30 provinces in Thailand, from Chiangmai in the North, and to Prachuabkirikhun in the South and through the Northeast and Central provinces. The largest number was found in the Korat region. In the Bangkok area, there was a seasonal incidence starting in July and extended through November which closely corresponded to the rainy season, and also the increased number of available Pila snails. In the other provinces, the incidence appeared to be a year round occurrence.

The incubation period in 15 groups of patients who shared the same infected food varied from four to thirty-six days. The severity of the symptoms may depend on the number of larvae eaten.

#### EXPERIMENTAL STUDIES:

Laboratory examination of Pila snails from 27 infective areas showed larvae of Angiostrongylus cantonensis in only 8 of these areas. The percentage of positive snails varied from 4.3 to 72.7%. The minimum number of larvae in any positive snail was one and the maximum was 732. Considering all of the epidemiological data to date, it seems that the Pila snail is the most important source of human infection. (Table II).

Laboratory examination of 887 rats from 10 provinces revealed Angiostrongylus cantonensis in only 13 animals or 1.5%. The Nan area had the highest number of positive cases, 13.8%

Experimental infections of the definitive host (rat) and the unsuitable host (guinea pig) using the local strain as well as the Honolulu strain of A. cantonensis larvae have been carefully studied. Clinical paralysis of limbs of the guinea pig was seen in 7 out of 21 animals, but none of the rats. A. cantonensis have been recovered in the central nervous system of the autopsied specimens. The optic nerves have been found to be directly involved by the worm in some animals

DISCUSSION: Evaluation of all clinical and epidemiological data, indicates that A. cantonensis is an etiologic agent for Eosinophilic Meningitis but perhaps is not responsible for the Myeloencephalitic form of the disease. Another nematode of sufficient size with great power to migrate in tissues such as Gnathostoma may also be a causative agent.

SUMMARY: A total of 775 lumbar punctures were performed on suspected cases of Eosinophilic Meningitis. Of the 775 cases, 345 were proven to have the disease. These proven cases were carefully worked up from the clinical, laboratory and epidemiological aspects. The incidence of 37 cases of Myeloencephalitis in this positive group was an interesting finding as was the observation that Myeloencephalitic cases had a higher mortality than did meningitis cases. Fourteen of the proven cases were in military personnel.

Laboratory experiments confirmed that the Pila snail was not a good intermediate host for A. cantonensis larvae. Examination of Pila snails from 27 areas in which confirmed cases of eosinophilic meningitis occurred revealed positives from only eight areas. The percentage of positive snails varied from 4.3 to 72.7%. Examination of 887 rats from 10 provinces showed only 13 or 1.46% to be positive for A. cantonensis.