

## ***Ascaris lumbricoides* EGGS AND HUMAN-INTESTINAL PROTOZOAN CYSTS FOUND IN RIVER WATER OF ANGKE RIVER, JAKARTA**

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### **Abstract**

Fecal contamination is a serious environmental problem at Angke River Jakarta. A cross-sectional study was conducted during April-June 2007 and the aim of the study is to assess the water quality of Angke River by detection of *Ascaris lumbricoides* eggs and the protozoan cysts. A total 24 L water of Angke River was collected from 8 sampling locations consisted of Kembangan/Duri Kosambi (upper reaches of river), Pesing Polgar (lower reaches of river), Teluk Gong (lower reaches of river), Pantai Indah Kapuk (estuary), River Mouth, left side of River Mouth, right side of River Mouth, and outer side of River Mouth. The water specimen was examined microscopically for *A. lumbricoides* eggs and protozoan cysts using a concentrated technique. Of 8 locations, 4 locations (50 %, 4/8), Kembangan/Duri Kosambi, Teluk Gong, Pantai Indah Kapuk and left side of river mouth were positive for *A. lumbricoides* eggs and 2 locations (25%, 2/8), Kembangan/Duri Kosambi and Pesing Polgar positive for *Entamoeba histolytica* cysts. Overall, 60 *A. lumbricoides* eggs and 2 *E. histolytica* cysts were found in 24 L water specimens. Among sampling locations, the most number of *A. lumbricoides* eggs were found at estuary. The water of Angke River, Jakarta, has been contaminated by human feces contained *A. lumbricoides* eggs and *E. histolytica* cysts. The water was unsafe for drinking water.

*Keywords: Ascaris lumbricoides, Angke River, Entamoeba histolytica, Jakarta*

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### **1. Introduction**

*Ascaris lumbricoides* (roundworm) belonged to a group of soil-transmitted helminths and human-intestinal protozoa infections are still public health problems in developing countries. In Indonesia, especially in Central Java, the prevalence of soil-transmitted helminthes ranges from 8.7% to 80% and of human-intestinal protozoa such as *Entamoeba histolytica* and *E. coli* ranges from 2.8% to 32.1%<sup>1</sup>. The parasitic infections affect residents in urban included in Jakarta, the capital city of Indonesia. In Jakarta, the prevalence of ascariasis is high particularly among primary school children reported. Moreover, the prevalence of human-intestinal protozoa ranges from 5.0%-36.0% to 20% found in residents in one thousand islands in north Jakarta<sup>2</sup>.

Fecal contamination is a serious environmental health problem<sup>3-6</sup>. Water of river for example, many residents in developing countries defecates at river so that it is contaminated by human feces. The water is furnishes a medium for ingestion of ova and cysts of parasites such as *A. lumbricoides* eggs and protozoan cysts<sup>4-6</sup>. Some studies showed that *A. lumbricoides* eggs are found not only in soil but also in water that are contaminated by human feces contained *A. lumbricoides* eggs<sup>5</sup>. In Indonesia, Multihartina<sup>7</sup> reported that *A. lumbricoides* eggs were found in water of Cikapundung River, West

Java. In addition, *A. lumbricoides* eggs were found in water of Ciliwung River, in Jakarta<sup>8</sup>. In Hyderabad, India, farming communities irrigating with wastewater, *A. lumbricoides* eggs were found in the wastewater<sup>9</sup>.

Recently, there is a collaboration research between Tzu Chi University, Taiwan, and University of Indonesia, Indonesia to study on water quality of Angke River in Jakarta. In 1999, more than 800 residents inhabited unhygienic areas of surrounding Angke River relocated to a new hygienic housing, the great love village of Tsu Chi, Cengkareng, North Jakarta, by Tzu Chi Foundation, Jakarta and the Governor of Jakarta. Eight years later, the study on water quality of Angke River was conducted. The aim of the study is to assess the water quality of Angke River by detection of *A. lumbricoides* eggs and the protozoan cysts.

### **2. Methods**

The coss-sectional study was conducted from April to June 2007. The study site was at Angke River in Jakarta. There were 8 sampling locations consisted of Kembangan/Duri Kosambi (upper reaches of river), Pesing Polgar (lower reaches of river), Teluk Gong (lower reaches of river), Pantai Indah Kapuk (estuary), River Mouth, left side of River Mouth, right side of River Mouth, and outer side of River Mouth.

Kembangan/Duri Kosambi is located in West Jakarta, whereas Pesing Polgar, Teluk Gong, Pantai Indah Kapuk and River Mouth are located in North Jakarta.

In the study, the samples were water collected from 8 sampling locations of Angke River. The sampling was done at each sampling location at the same time. Each sampling location, 3 L superficial water of Angke River was collected using a bucket (5L), sieved by a sieve and entered in a labeled water container (5L). All of the labeled water containers were transferred to the Laboratory of Department of Parasitology, University of Indonesia in Jakarta.

In this study used a concentrated method as previous described<sup>10</sup>. Briefly, 3 L water was centrifuged, 3,000 rpm for 5 minute. Supernatant was eliminated. Sedimentation was entered in an effendorf tube (1.5 mL) and it was examined by the light microscope for the presence of *A. lumbricoides* eggs and protozoan cysts.

### 3. Results and Discussion

Of 8 locations, *A. lumbricoides* eggs were found in Kembangan/Duri Kosambi (13.33%, 8/60), Teluk Gong (3, 5.0%, 3/60), Pantai Indah Kapuk (80.0%, 48/60) and left side of river mouth (1.7%, 1/60). No *A. lumbricoides* eggs were found in Pesing Polgar (0, 0.0%), river mouth (0, 0.0%), right side of river mouth (0, 0.0%) and outer side of river mouth (0, 0.0%). *Entamoeba histolytica* cysts were found in Kembangan/Duri Kosambi (+) and Pesing Polgar (+). No *E. histolytica* cysts were found in Teluk Gong (-), Pantai Indah Kapuk (-), river mouth (-), left side of river mouth (-), right side of river mouth (-) and outer side of river mouth (-). Overall, 60 *A. lumbricoides* eggs and 2 *E. histolytica* cysts were found in 24 L water specimens. Among sampling locations, the most number of *A. lumbricoides* eggs were found at eastuary.

This study showed that the water quality of Angke River from Kembangan/Duri Kosambi to outer side of river mouth has been contaminated by human feces. Contamination was proved by *A. lumbricoides* eggs and *E. histolytica* cysts found in the water of Angke River.

*A. lumbricoides* eggs may serve as an indicator of human feces contamination<sup>6</sup>.

In the life cycles of *A. lumbricoides*, *A. lumbricoides* adults inhabit in the intestinal tract. A gravid female *A. lumbricoides* may product 200.000 eggs/day. All of *A. lumbricoides* eggs are deposited in human feces. When a human infected with *A. lumbricoides* defecates at a toilet located on river, the human feces contained *A. lumbricoides* eggs contaminate it. Therefore, *A. lumbricoides* eggs found in the river water. *A. lumbricoides* eggs spread thoroughly the river from Upper reaches of river (Hulu) up to river mouth. A similar mode also found in *E. histolytica* cysts.

In Kembangan/Duri Kosambi and Teluk Gong were found *A. lumbricoides* eggs and *E. histolytica* cysts because inhabitants living around it defecate in traditional toilets located at either left or right sides Angke River. In addition, human feces container trucks from many locations in Jakarta threw away human feces at the river of Kembangan/Duri Kosambi.

The water specimens from Pantai Indah Kapuk were positive for *A. lumbricoides* eggs because Pantai Indah Kapuk is an estuary area of Angke River and at left or right sides of river of Pantai Indah Kapuk has several traditional toilets. In contrast, at Pesing Polgar was not detected *A. lumbricoides* eggs. At Pesing Polgar has not any traditional toilets but has a lot of trash in water of river. *A. lumbricoides* eggs may more difficult found in it because of a lot of trash. In addition, *A. lumbricoides* eggs found in left side of river mouth showed that the river mouth was high contaminate with human feces from other locations.

Although at Pesing Polgar has not any traditional toilets, *E. histolytica* cysts were found. Clearly, Pesing Polgar is lower reaches of Angke river where is contaminated by human feces, but *A. lumbricoides* eggs and/or *E. histolytica* cysts were not always found from upper reaches (hulu) to outer side of river mouth of Angke river. There are many factors contributed high or low number of these gastrointestinal parasites in environment such as climate factors<sup>4</sup>.

**Table 1. The Number of *A. lumbricoides* eggs and *E. histolytica* cysts Found in Water of Angke River, Jakarta, April 2007**

No	Part of river	Sampling locations	Number of <i>A. lumbricoides</i> eggs	<i>Entamoeba histolytica</i> cysts
1	Upper reaches of river (Hulu)	Kembangan/DuriKosambi	8 (8/60, 13.3%)	+
2	Lower reaches of river (Hilir)	Pesing Polgar	0 (0/60, 0.0%)	+
3	Lower reaches of river (Hilir)	Teluk Gong	3 (3/60, 5.0%)	-
4	Estuary	Pantai Indah Kapuk	48 (48/60, 80.0%)	-
5	River mouth	River Mouth	0 (0/60, 0.0%)	-
6	River mouth	Left side of river mouth	1 (1/60, 1.7%)	-
7	River mouth	Right side of river mouth	0 (0/60, 0.0%)	-
8	Outer side of river mouth	Outer side of river mouth	0 (0/60, 0.0%)	-
Total			60	2(+)

Population growth, in Jakarta, increasing year by year may affect a Angke river quality. In this study showed that inhabitants lived surrounding the Angke river have contaminated the river. Although Tzu Chi Foundation and Jakarta Government have relocated some of them, the contamination of human feces may continue because there are many people lived there not yet relocated. It seemed that the relocation may not improve water quality of Angke river.

In the future, we should survey on river water quality from other locations in Jakarta such as Cideng, Ciliwung, and Cipinang Rivers using a similar method employed in the present study. Data collected from the survey will be useful for Jakarta Government to know a level of the human feces contamination in river.

#### 4. Conclusion

The water of Angke River, Jakarta, has been contaminated by human feces contained *A. lumbricoides* (roundworm) eggs and *E. histolytica* cysts. The water was unsafe for drinking water.

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