

# CYSTICERCOSIS IN SURABAYA, INDONESIA

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## INTRODUCTION

Cysticercosis cellulosa is the systemic form of infection with the larvae of the *Taenia solium*. The usual intermediate host, the pig, becomes infested with the parasite as a result of ingesting material contaminated with egg-laden faeces. The eggs hatch, and the larvae penetrate the wall of the pig's intestine by means of their hooklets and possibly aided by lytic secretions. The oncospheres enter the venule and are carried throughout the body, eventually becoming encysted in various sites particularly the skeletal muscle (Marsden, 1971).

According to Faust and Russell (1964), man becomes infected in a similar manner. The sources of the eggs that human ingest are (1) faeces from a person who harbors an adult tape worm (hetero infection); (2) faeces containing eggs that are transferred from anus to mouth by unclean hands of an infected person (external auto infection); and (3) the small intestines, from which ripe eggs may be carried by reverse peristalsis into the stomach, where they are conditioned for hatching (internal auto infection). The eggs hatch in the stomach or the upper portion of the small intestines, and the oncosphere quickly penetrates the intestinal wall, entering the lymphatics and blood vessels.

Man becomes infected with cysticercus larvae by ingesting them in raw or inadequately cooked pork. In the stomach the larva is digested out of the pork flesh; in the upper level of the small intestine the head evaginates, becomes attached to the wall of the small intestine and develops into a mature worm.

Cases of cysticercosis have been reported from many countries (Campagna, 1954; Dent, 1957; Greenspan and Stevens, 1961; Gelfand and Jeffrey, 1973; Jampol *et al.*, 1973; Tumada and Margono, 1973). Cysticercosis is rarely reported in Indonesia, with only six cases previously described. Hausman *et al.*, (1950) reported one case, Lie *et al.*, (1955) reported one case of cerebral cysticercosis, Soebroto *et al.*, (1960) reported two cases from Surabaya and Adnjana *et al.*, (1961) one case also from Surabaya. Hadidjaja *et al.*, reported the sixth case in 1971. Previous reports and six new cases of cysticercosis found in Surabaya during the period of 1963 to June 1977, are analysed herein.

## MATERIALS AND METHODS

This study of cysticercosis was aimed at analysing all material received at the Department of Pathology, Faculty of Medicine, Airlangga University, Surabaya.

During the same period 80,000 tissues were evaluated and nine cases of cysticercosis were thus diagnosed. These cases were analysed to determine age, sex, religion, site of predilection and size of cysts.

The host tissue reaction was studied using the hematoxylineosin stain, the Van Gieson and the periodic acid Schiff technique.

## RESULTS

Previously reported cases of cysticercosis in Surabaya are shown in Table 1. Table 2 shows the six new cases of cysticercosis.

The incidence of cysticercosis diagnosed was 0.011%. Five of these nine cases were

CYSTICERCOSIS in SURABAYA, INDONESIA

Table 1

Previously reported cases of cysticercosis in Surabaya (Soebroto *et al.*, 1960; Adnjana *et al.*, 1961).

No. case	Year	Sex	Nationality	Age	Location	Religion	nodules m/s
1.	1960	M	Chinese	22	L.arm,neck chest.	Buddhist	m
2.	1960	F	Indonesian Bali	25	Neck,Back R. arm	Hindu	m
3.	1961	M	Chinese	49	Head,Neck	Buddhist	m

M = male, F = female, m = multiple, s = single.

Table 2

New cases of cysticercosis in Surabaya.

No. case	Year	Sex	Nationality	Age	Location	Religion	Nodules m/s
1.	1963	F	Chinese	40	R. arm	Buddhist	s
2.	1965	M	Chinese	5	Neck,Back	Buddhist	m
3.	1973	F	Chinese	25	Neck	Christian	s
4.	1976	M	Indonesian Bali	38	Neck	Hindu	s
5.	1977	F	Chinese	28	L.arm	Christian	s
6.	1977	M	Chinese	38	Chest	Christian	s

M = male, F = female, m = multiple, s = single.

Table 3

Cases of cysticercosis according to sex distribution and age group.

Age in years	0 - 10		11 - 20		21 - 30		31 - 40		41 - 50					
Sex	M	F	T	M	F	T	M	F	T	M	F	T		
No. of cases	1	1		-	-	-	1	3	4	2	1	3	1	1

M = male, F = female, T = total.

males and four females (Table 3). The maximum age incidence was in the 21-30 year group in which four cases were noted (Table 3). The incidence appeared to decrease with age. It was further observed that by religion four patients were Buddhists, three were Christians and two were Hindus.

Grossly the cysticerci measured 0.6 to 1.1 cm (average 0.85 cm), were spherical in shape. The scolex appeared invaginated.

Microscopically the scolex showed the head to be composed of suckers and a rostellum of hooklets. Surrounding the head, the body of the parasite appeared to have an inner and outer limiting membrane. The outer membrane was undulated and double-walled. This membrane appeared to be in contact with the host tissue at one point. A distinct bladder cavity was noted surrounding the parasite.

Studies of the host tissue at the contact

point revealed that the tissue reaction were seen in relation to endothelial cells with appeared transformed into epitheloid cells and assume an erect position. These changes appeared patchily. The epitheloid cells, some showing evidence of mitosis and giant cell formation. The second layer consist of foamy cells, plasma cells, lymphocytes and eosinophils. The outer layer composed of fibrous connective tissue. Destruction of skeletal muscle by proliferating fibrous tissue was noticed. In three tissues examined polymorphs were also seen.

Two cases showed a distinct bladder wall which consisted of hyalinised fibrous tissue with a scattered minimum amount of mononuclear infiltrate. The inner layer was covered with a distinct lining of flattened endothelium. This indicated that the bladder wall originated from vascular channels.

#### DISCUSSION

An incidence of 0.011% of cysticercosis was revealed in this study. Seven cases were Chinese and two were Indonesian from Bali. By religion four were Buddhists, three Christians and two Hindus. No Muslim was found among this group. This community is precluded from pork consumption by their religious precepts and supposed to be spared from *Taenia* infestation. The sex difference was not significant and the predilection of location was found at the neck.

Faust and Russell (1964) placed the subcutaneous tissue to be the site of maximum involvement in man. In our series five sites were located in subcutaneous tissues and four in the skeletal muscles. *Cysticercus cellulosae* have been reported from the human brain, subretinal, and eyelid (Becker and Jacobson; 1951; Simms *et al.*, 1969, Jampol *et al.*, 1973; Bartholomew, 1975). From radiological studies no cyst was found in the cerebrum in our cases.

The tissue reaction were composed of (a) a bladder wall lined by epitheloid cells in the inner aspect; (b) a second zone of lymphocytes plasma cells, macrophage and varying numbers of eosinophils; (c) an outer zone of proliferating fibrous connective tissue. Three cases showed also leucocytes infiltration and congestion.

According to Thomas *et al.*, (1973) this acute inflammatory cells infiltration was a response to a dead or dying parasite, and the increase in vascularity close to the epitheloid cells could be explained that the macrophages actively mediated transportation of secretion and excretion of the parasite. The mononuclear reaction and giant cell formation was a true host reaction against a parasite which was considered as foreign body. The chronic inflammation stimulated a fibrous connective tissue reaction which finally encapsulated the parasite. At this stage the inner layer of the bladder wall composed of thin stretched endothelium and the mononuclear infiltrate subsidized.

Comparative studies were made in Indonesia, Inne Susanti reported from Denpasar that there were five cases of cysticercosis found during the last seven years. Four were males



Fig. 1—*Cysticercus cellulosae* H & E x 100.  
Note the suckers (arrow) and the rostellum with hooklets.

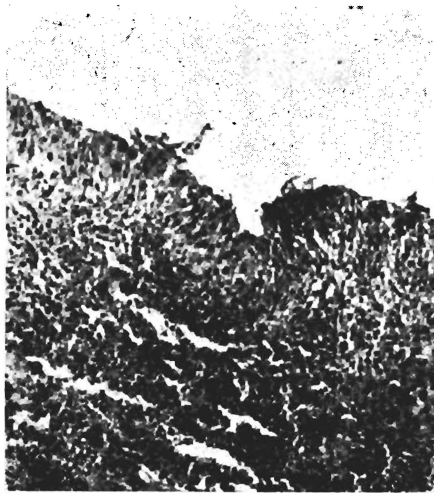


Fig. 2—Host tissue reaction H & E x 100.  
Note the epithelioid cells, external to which are the chronic inflammatory cells.

and one female, all of them were Indonesian from Bali. No Chinese was found among this group. By religion they were Hindu and the predilection of location was found at the back and arm (each three cases). The sex difference was significant four males to one female.

The possible factor influencing the relative high prevalence in Bali are (a) the inadequate cooking of pork meat; (b) the traditional way of cooking by mixing the roasted chop meat with fresh porcine blood; (c) the lack of meat inspection in villages; (d) the lack of sanitary law regarding disposal of human excreta.

Goenawan reported one case of cysticercosis from Ujung Pandang, a Chinese male with multiple cutaneous cysticercosis. From Manado and Medan, Tambayong and Soegito respectively reported that there was no case of cysticercosis found during the last five years.

#### SUMMARY

Six new cases of cysticercosis and three previously reported cases in Surabaya have been

examined in order to determine the age, sex, religion, sites of location and size of cyst. The host response was also discussed. A comparative study was also conducted with other centres in Indonesia. The relative high prevalence of cysticercosis in Bali and the probable influencing factors was also presented.

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