

The problem of Taeniasis and Cysticercosis in Irian Jaya, Indonesia

Sri Surastuti Margono*, Akira Ito[#], Thomas Suroso^f

Abstrak

Penyakit yang disebabkan *Taenia solium* dewasa dan larva, menyebar ke arah barat Irian Jaya sampai melintasi batas Indonesia ke Papua New Gini. Dua puluh Puskesmas melaporkan 638 dan 945 kasus baru dengan gejala epilepsi, berturut-turut pada tahun 1994-1995. Kuesioner terhadap 31 responden mendapatkan 83.9% buta huruf, 93.6% petani dan semua responden kadang-kadang makan daging babi; tidak pernah makan daging lain. Di daerah ini tidak ada sumber air minum bersih dan juga tidak ada fasilitas sanitasi. Babi berkeliaran di sekitar rumah, jarang dikandangkan. Setelah kerjasama dengan berbagai pihak antara lain dengan Asahikawa Medical College, Jepang dapat diperiksa 49 sampel serum dengan immunoblot yang menghasilkan 67% kasus dengan gejala kejang epilepsi dan 65% dengan benjolan subkutan positif terhadap sistiserkosis. Aktivitas penduduk ke daerah lain, higiene perorangan dan lingkungan, pentingnya babi dalam kehidupan masyarakat merupakan beberapa hal yang menyebabkan taeniasis dan sistiserkosis merupakan masalah penting di daerah ini. (*Med J Indones* 2001; 10: 110-4)

Abstract

The disease, caused by the adult and larva of *Taenia solium*, spread to the western part of Irian Jaya crossing the border of Indonesia to Papua New Guinea. Twenty local health centers reported 638 and 945 new cases with epileptic seizures in 1994 and 1995 respectively. Questionnaires were distributed to 31 respondents with results as follows: 83.9% were illiterate, 93.6% farmers and all of them sometimes ate not well-cooked pork; no other meat was consumed. In this area no healthy drinking water was available; also there was no sanitary facilities. Pigs were roaming around the houses, rarely the pigs were put behind fences. After international collaboration with several institutions, e.g with Asahikawa Medical College, Japan, 29 serum samples were examined by immunoblot with positive results for 67% of the cases suffering from epileptic seizures and 65% with subcutaneous nodules. Moving of people to other areas personal and environmental hygiene, the importance of pigs in the daily life of the community were important issues in maintaining the disease being caused by *T. solium* in this area. (*Med J Indones* 2001; 10: 110-4)

Keywords: *Taenia solium*, Irian Jaya, spreading, international collaboration

Cases of taeniasis and cysticercosis in Irian Jaya, a province of Indonesia were reported for the first time in Enarotali, Paniai District. Among 170 hospitalized patients 9% were found positive with *Taenia* eggs. Thirteen cases suffering from cysticercosis were reported during 6 months in 1972-1973^{1,2}. Subianto et al³ found that many patients with burns also suffered from epileptic seizures, probably caused by a number of cysticerci located in the brains. A serological survey revealed a correlation between symptoms and seropositive results.⁴

Cases with epileptic seizures were increasing in Assologaima Subdistrict, Jayawijaya District. In 1991 only 4 cases among a population number of 13 334 were reported, whereas in 1995, with a population number of 17 493, 145 cases were recorded.⁵

The disease was spreading from the western to the eastern part of Papua already crossing the border of Indonesia into Papua New Guinea. Besides the high mobility of people, the level of personal hygiene and environmental hygiene in these areas should be considered as parts of the problem. Important issues such as behavior of the people in the way of keeping their pigs and consuming not well-cooked pork are important aspects in causing the high endemicity of the disease.

The diagnosis of the disease, treatment and health education create many difficulties. Manpower and

* Department of Parasitology, Faculty of Medicine, University of Indonesia, Jakarta, Indonesia

[#] Department of Parasitology, Asahikawa Medical College, Asahikawa, Japan

^f Directorate General of Communicable Disease Control and Environmental Health, Ministry of Health and Social Welfare, Jakarta, Indonesia

budget are limited for the control of taeniasis and cysticercosis.

DESCRIPTION OF LOCATION

Paniai District is located in the Kamu Valley, the western part of the central highlands of Irian Jaya. The altitude ranges from 1400 -1800 m above sea-level. There are three lakes in this valley: Paniai, Tage and Tigi Lake.

The district of Jayawijaya is located in the eastern part of Irian Jaya. The altitude is between 600 m to more than 3000 m above sea-level. Low and high mountains are found in this area with fertile, wide spread valleys. For most areas the climate is tropical hot and humid, the temperature varies between 12-28°C, with much rain, average 190 mm/month.

TAENIASIS AND CYSTICERCOSIS IN IRIAN JAYA

The first cases suffering from taeniasis were reported after stool examinations revealed 9% of 170 hospitalized patients positive for *Taenia* eggs. The method used for the stool examinations was the formal-ether method⁶. Stool samples from several patients were examined more than once.¹

During a period of 6 months in 1972-1973, 13 cases suspected with cysticercosis were diagnosed at the Enarotali hospital, Paniai District. The patients consisted of 5 women and 8 men ranging in age from 16 to 40 years. Seven patients suffered from loss of consciousness and general convulsions from 1-3 times a week. These seven patients complained of headache and or dizziness. Two among the 7 patients had personality changes, which was reported by their relatives. Complaints on disturbances of the eyes, such as blurred vision, photophobia and diplopia were found in six patients. Palpable cysticercus nodules in the 13 patients were mostly located in the biceps muscle region (9 cases). Other location of palpable cysticercus nodules were in the region of the forearm, region of the lateral portion of the major pectoral muscle, region of the deltoid muscle, neck, abdominal wall and near the mouth. Several subcutaneous nodules were removed and diagnosed as cysticerci of *Taenia solium*.²

Clinical signs and symptoms by age, of 318 inhabitants of the Obano village, south-west of the Paniai Lake, who were interviewed and examined, by Desowitz et al⁴ are shown in Table 1. It was found that none of the sixty-six children between the age of 0-4 years had any signs or symptoms. Only one among the forty children, aged 5-9 years had epileptic seizures (2.5%). One among 11 children in the age group of 10-14 years had epileptic seizures (8.3%) and 1 (7.1%) among 13 individuals in the age group 15-19 years suffered from seizures and cysts. In the age group of 20-50 years, consisting of 186 persons, eighty-six persons had signs and symptoms. Epileptic seizures were found in 39 cases (21.0%), 6 cases had seizures as well as subcutaneous nodules, whereas 5 cases had only palpable cysts. Thirty cases (16.1%) complained of headache and 6 cases of "weakness" or pain (3.2%).

Table 1. Clinical data and serological results (CIEP) of 125 serum samples in Obano, Paniai District

	Number	Seropositive (%)
Subcutaneous cysts (4 with seizures)	8	8 (100)
Epileptic seizures	22	17 (77.3)
"Weakness" or pain	3	2 (66.6)
Headache	21	9 (42.9)
No sign / symptoms	71	16 (22.5)

Source : Desowitz et al.⁴

The immuno-electrophoresis (CIEP) technique found that among 125 serum samples all individuals (8) with palpable subcutaneous cysticerci were serologically positive. Four among the 8 individuals with nodules had a history of seizures. Among 22 individuals with a history of seizures only 77.3% were positive, whereas 22.5% individuals without any clinical complaints were positive.⁴

Further investigations in this area discovered that burns and epileptic seizures were associated with cysticercosis.³ The number of patients with burns, admitted to the hospital of Enarotali markedly increased during 1973 to 1976. Before 1973 only a few cases were hospitalized, whereas during 1973 to 1976, 157 were treated at the hospital. Among the cases with burns 62.8%, 33.1% and 16.6% respectively suffered from seizures, had cysticercus nodules and stool samples were positive for *Taenia* eggs or proglottids. Burns were associated with cysticercosis in the age group of over 11 years. In

these groups 88 out 121 cases had epileptic seizures before or during hospitalization.

During the last years cases with taeniasis and cysticercosis were found in increasing numbers in Jayawijaya District, an area east of Paniai District. Reports of 20 local health centers in Jayawijaya District mentioned a total of 638 and 945 new cases with seizures respectively in 1994 and 1995 (Table 2). During the two years the number of death due to the disease were six and eight⁷. One of the local health center was in Assologaima. At this health center an increasing number of cases with seizures was recorded⁷. In the year 1991 only 4 cases were reported among a population of 13 334 people, which meant an incidence rate of 0.03%. During the years 1992, 1993, 1994 and 1995 respectively 41, 68, 35 and 145 cases were recorded at the same health center. During these four years the incidence rates were respectively 0.28, 0.43, 0.21 and 0.83%. The cysts extirpated from 14 men and 1 pig were diagnosed as cysticercus of *Taenia solium*.

Table 2. Number of new cases with epileptic seizures at health units (HU) in Jayawijaya District, 1994 and 1995

Number of HU	Number of new cases	
	1994	1995
1-5	352	511
6-10	275	431
11-15	11	3
16-20	0	0

Source : Widarso et al⁷

A questionnaire distributed to 31 respondents in Assologaima subdistrict revealed that 83.9% were illiterates, 93.6% farmers and all of them were sometimes eating pork, no other meat. All of them roasted the meat on hot stones (Table 3). The river was used as a source of drinking water by 90.3% and 90.3% admitted that they did not cook the water before drinking. Among them 64.5% did not wash their hands before eating and 58.1% after defecation. Of the respondents 64.5% defecated around bushes or in the forest. Widarso et al.⁷ described that none of them had toilet facilities, therefore probably the number of the respondents who are defecating promiscuously was much higher than admitted by themselves (Table 4). It was also observed that pigs were roaming around the houses, entering houses, although sometimes pigs were put behind fences.

Diagnosis of the disease was mostly based on clinical symptoms. Laboratory facilities were very limited; no radiological equipment was available such as CT-Scan.

Table 3. Identity and eating habits of 31 respondents in Subdistrict Assologaima (1996)

Identity and eating habits	%
Illiterates	83.9
Farmers	93.6
Christians	100
Consuming pork	100
Cooking with hot stones	100

Source : Widarso et al⁷

Table 4. Personal and environmental hygiene of 31 respondents in Subdistrict Assologaima (%)

Habits and environmental hygiene	%
Source of water (river)	90.3
Drinking water (uncooked)	90.3
Not washing hands	
▪ before eating	64.5
▪ after defecating	58.1
Habit of defecation (bushes/forest)	64.5
No toilet facilities	100

Source : Widarso et al⁷

INTERNATIONAL COLLABORATION

After international collaboration was established, especially with Department of Parasitology, Asahikawa Medical College serological studies and DNA analysis could be conducted. Wandra et al.⁵ reported a pig from Jayawijaya, harboring multiple cysts, serologically positive, using new GP antigens for the immunoblot and ELISA method^{8,9}. Mitochondrial DNA analysis of the material (the pigs cyst) confirmed the identification except for 3 of 391 basepairs, at 130, 136 and 334, of the CO 1 gene, while Bowles and McManus described R, R and Y, respectively.⁵

A total of 49 serum samples from people attending the local health unit in Assologaima were serologically examined (Table 5). Immunoblot analysis revealed that 12 (67%) of 18 patients with anamnesis of seizures and 20 (65%) of 31 cases with subcutaneous nodules were serologically positive for cysticercosis.⁵

A recent survey in other villages, i.e. Tulem, Hepuba and Siepkosi found that among 50 persons with

immunoblot seropositive cysticercosis 68.0% suffered from clinical signs (Table 6). Table 7 shows that among 161 seropositive cases, living in these three villages, 47.50% was found in the age group of 24-32 years (international collaboration team, unpublished data).

Table 5. Immunoblot analysis of 49 serum samples from Jayawijaya District

	Number	Seropositive (%)
Epileptic seizures	18	12 (67)
Subcutaneous nodule	31	20 (65)

Source : Wandra et al⁵

Table 6. Clinical signs of peoples in three villages of Jayawijaya District with immunoblot seropositive cysticercosis, 1998

Clinical signs	Number	%
Seizures, headache and cysts	11	22.0
Seizures and headache	8	16.0
Seizures and cysts	1	2.0
Headache and cysts	5	10.0
Seizures	0	0.0
Headache	6	12.0
Cysts	5	10.0
No signs / symptoms	14	28.0
Total	50	100.0

Source : International collaboration team (unpublished data)

Table 7. Immunoblot seropositive cysticercosis according to age groups in three villages of Jayawijaya District, 1998

Group of age (years)	Number of samples	Seropositive (%)
6-14	8	2 (25.00)
15-23	26	5 (23.08)
24-32	44	19 (47.50)
33-41	38	11 (28.95)
42-50	25	9 (36.00)
≥ 51	20	4 (20.00)
Total	161	50 (31.05)

Source : International collaboration team (unpublished data)

Sera, obtained from eight pigs from several countries, including one from Jayawijaya, Indonesia, harboring multiple cysticerci, showed very similar antibody responses as human cysticercosis. The ELISA optical density values were between 0.567 and 2500 (maximum OD), whereas those from uninfected four pigs were 0.076 ± 0.014 . The cut-off value in human

cysticercosis was 0.150.⁹ These preliminary results strongly suggest that a new serodiagnostic technique using GPs purified by a preparative iso-electric focusing is most useful and reliable for both swine and human cysticercosis.⁸ After this preliminary study and several other studies hopefully the serodiagnosis using specific antigens purified by a single step of preparative iso-electric focusing could be used in detecting human, as well as swine cysticercosis.

At the end of 1999 a study using copro-antigens was started as a modus to detect sources of the spreading of the disease, which are persons harboring adult *Taenia solium* worms.

CONCLUSIONS

The high mobility of people, personal and environmental hygiene, husbandry of pigs and consuming of not well-cooked pork are important issues of the problem on taeniasis and cysticercosis in Irian Jaya Province of Indonesia. To solve the problem, health education especially for students, treatment of adult worm carriers and their families should be given high priority. These activities should be based on an integrated approach of several institutions and strong commitment of the central as well as the local government.

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