

A SURVEY REPORT - JULY 1993:
CYSCTICERCOSIS IN THE GRAND DANI VALLEY,
JAYAWIJAYA DISTRICT, IRIAN JAYA PROVINCE, INDONESIA

Sukwan Handali, Hao Liying, Carla Lusikoy, Jermias Senis and Deri Sihombing

The Jayawijaya District Health Office, Wamena, Indonesia

Abstract. A community survey was conducted in Gran Dani Valley, Jayawijaya District, Irian Jaya Province, Indonesia. A total of 537 adults were asked whether they experienced epilepsy, and were physically examined for cysticercosis cysts. Forty-eight percent experienced at least one attack of epilepsy. Men had attacks 2.5 times more often than woman. Cysticercosis cysts were found in 26.5% men having 4.6 times more cysts than women. The cysts were mostly found in the pectoral region.

The survey showed a raise cysticercosis in the Highlands of Irian Jaya and is considered a public health problem. Treatment was not available, but improvement of personal and environmental hygiene would be important. Mass de-worming activity should be a part of routine public health service in the district.

INTRODUCTION

Reports from the Jayawijaya Bishop of the death of several Catholic Church leaders by drowning related to epilepsy, encouraged health workers in the Jayawijaya District Health Office to study on epileptic seizures and its relations to brain cysticercosis. The community in the Jayawijaya Diocese are members of Grand Dani tribe well known for their traditional culture. They live in poor ventilated huts, have no access to latrines and they defecate randomly in the bushes.

Pigs wander around the neighborhood, have special social value, and are eaten only on special occasions. The pigs are cooked in a traditional way, in stone oven, with the meat usually only half cooked. Some people still eat meat although they know it contains *Taenia* cysts. These factors contribute to the problem of food-borne parasitic infections in the area.

The spread of this new and deadly disease was not recognized by people. Therefore it was important to conduct a preliminary study to understand the importance of cysticercosis and the epilepsy problems and to determine the factors that contribute to the distribution of cysticercosis in the Grand Dani Valley.

MATERIALS AND METHODS

The population of the Gran Dani Valley belong to the Jayawijaya Diocese. There are eight parishes in the valley (one parish is in the capital of the district, Wamena). All parishes and one station of the town was chosen for sampling.

The population at risk (above 15 years) was asked to come to the clinic at an appointment time. More people came to the clinic with symptoms of epilepsy and cysticercosis and were not representative of the population as a whole.

The people were invited to participate in a health education program on the cycle of the tape worm. This also involved group discussion on the cause of epilepsy, and means to prevention as well as why preventive measures were not carried out even though the people understood the cause of the disease.

After the health education sessions, people were interviewed regarding their history of passing worms during the last month, epileptic history, defecation habits, and latrine ownership. They were physically examined to detect subcutaneous cysts on their body, especially the upper part of the body (Tumada and Margono, 1973; Subianto, 1978). No histologic examination was conducted on the cyst found.

The people were asked to submit stool samples. Some stool samples were examined directly with Lugol's iodine staining in front of the people. Positive stool sample, all the population were asked to see their stool condition. The rest of the stool samples were stored in tubes containing 2% formalin, and were examined at the hospital laboratory with Lugol staining.

A total of 537 people was examined in the survey, 74% males and 26% females, and only 380 people (75% males and 25% females) submitted stool samples. Those submitting positive worm samples were treated.

The data was analysed with SPSS PC + version 3.1 program.

RESULTS

The number of people who reported passing the worms in the last one month was 43% and they complained of having epilepsy-like seizures. Among them, five persons had seizures in the past and these seizures waned after several years.

Table 1 presents the relationship between sex and epilepsy attacks. There was a significant difference between sex and history of epilepsy; men have symptom of epilepsy 2.5 times more often than women.

Cysts were found on 27% of those examined; 94% with multiple cysts. Of the multiple cysts, fifteen persons (2.8%) had cysts in five locations (deltoid, pectorals, temporal, volar and extensor arms). The locations of the cysts were: 21% in the pectorals area, 21% in the volar area of the biceps muscle, 20% in the deltoid area, 16% in the upper back, 9% in the temporal area, 46% in popliteal area, 4% in neck, 3% in abdomen, < 1% in gluteal. No patients were found with pseudoatrophy of the muscle caused by the cysts (Ventagaraman and Vijayan, 1983).

The relationship between sex and cysts is presented in Table 2. There was a significant relationship between sex and cysts finding ($p = 0.0000$), men having 5 times as many cysts as women.

Table 1

Relationship between sex and history of epilepsy.

	No history of epilepsy (%)	History of epilepsy (%)	Total
Men	169 (33.9)	198 (39.8)	367 (73.7)
Women	90 (18.1)	41 (8.2)	131 (26.3)
Total	259 (52.0)	239 (48.0)	498

Chi squares = 18.95, $p = 0.0000$; OR = 2.57

Table 2

Relationship between sex and subcutaneous cysts finding.

	No. cyst (%)	Cyst + (%)	Total
Men	258 (19.6)	124 (23.8)	382 (73.5)
Women	124 (23.8)	14 (2.7)	138 (26.5)
Total	382 (73.5)	138 (26.5)	520

Chi squares = 24.76, $p = 0.000$; OR = 4.6

The relationship between epilepsy history and cysts finding is shown in Table 3. People with cysts, 163/378 (43.12%) reported epilepsy.

The frequency of *Taenia* was 0.3%. There was no relationship between sex and *Taenia* infection.

Table 3

Relationship between epilepsy history and cysts finding.

	No history of epilepsy (%)	History of epilepsy (%)	Total
Cysts +	215 (42.9)	163 (32.5)	378 (75.4)
Cysts -	45 (9.0)	78 (15.6)	123 (24.6)
Total	260 (51.9)	241 (48.1)	501

Table 4

Relationship between sex and taeniasis.

	Positive (%)	Negative (%)	Total
Men	0	282 (75.4)	282 (75.4)
Women	1 (0.3)	91 (24.3)	92 (24.6)
Total	1 (0.3)	373 (99.7)	374

Chi squares = not measured as expected value < 5 was more than 25%

DISCUSSION

Cysticercosis and epilepsy frequencies in the Baliem people increased (26.5% cysticercosis, 48% epilepsy) over that reported in 1977 (2% cysticercosis, and 14% epilepsy). Taeniasis is decreased (0.3% compared with 10% and 4% in 1977). Compared with the situation in Enarotali (epilepsy 3.5%, cysticercosis 4%, and taeniasis 8-17%), cysticercosis in Baliem Valley was high but taeniasis was lower in Enarotali (Subianto, 1978; Gunawan, 1979; Subianto *et al*, 1978):

The people in Baliem valley do not destroy the cyst in pork, and eat the contaminated meat (Genawan *et al*, 1976). Pigs are eaten at every ceremony. Men usually participate in the ceremony and this is why men experienced more epilepsy seizures.

Praziquantel can be used to treat taeniasis. (5 mg/kg, single dose, Thomas and Andrew, 1977; Anonymous, 1976). However, the drug is still too expensive to be a part of the health control program. Albendazole is another alternative but it is not readily available in Indonesia. The use of traditional medicine such as seeds of pumpkins in a dose of 180 grams (around 1,000 seeds) be of value but the effectiveness is unknown (Hadidjaja, 1971).

Praziquantel in a low dose (300 mg per day for three days and 600 mg per day for next three days or 5-10 mg/kg/day) is useful for neurocysticercosis. The problem is the cost. Neurocysticercosis has a high mortality rate, 50-80%, and every effort should be made to use the drug (Pun and Wong, 1984).

The efficacy of praziquantel was determined by the state of the cysts and number of cysts before and after treatment. Patients with calcified cysts receive no advantage with treatment and if there are too many living cysts, treatment could cause an inflammatory reaction and in some cases cerebral infarction. Computed tomography evaluation in patients indicated that benefit from treatment of those who have 6-7 cysts is more than those having more than 7 (Woo *et al*, 1988).

Mebendazole may be used for reducing the neurocysticercosis since the drug is known to influence hydatid cysts (Anonymous, 1976). Early diagnosis is of value especially before the cyst enter the brain. Immunological techniques such as ELISA may indicate infection and mebendazole treatment

may be of value. (Coker-Vann *et al*, 1981, 1984; Diwan *et al*, 1982).

At present, praziquantel/ albendazole are not available in the endemic area, where there are patients with epilepsy related with neurocysticercosis. In the Baliem Valley patients were treated with phenobarbital only. This drug is inexpensive, and the success rate for epilepsy is around 95% for patients who never received anthelmintic treatment (Adamekun Band Meinaedi, 1990).

Since there is a prevalence of helminthic infections (the prevalence is over 30%, it is the time to begin a mass anthelmintic treatment program 2-4 times a year among the population (Arfan, 1984; Gupta, 1990). Treatment will be beneficial by decreasing the environmental contamination with improvement of children nutrition (percentage weight-for-age of the children reportedly 30% 14 weeks after the treatment) (Gupta 1990; Stephenson *et al*, 1980).

For the mass treatment, it is proposed to use the combination tablet of mebendazole 200 mg per day and pamoate 60 mg per day for three days that has a 100% efficacy (Purnomo *et al*, 1980).

Sanitation (Gryseels and Gigase, 1985) and personal hygiene is important for the Baliem Valley people (Arfan, 1984). But, these efforts are not easy, to provide safe water piping is expensive, to change the culture of the people will need hard work.

CONCLUSION

1. Epilepsy related to neurocysticercosis and intestinal worm infection in the Baliem valley has become a public health problem.
2. The dissemination of the diseases was influenced by cultural factors and the behavior of defecating in the bush, roaming pigs who eat feces.
3. Epilepsy related with neurocysticercosis was higher in men than women.

REFERENCES

- Anonymous. The Joint FAO/UNEP/WHO. Consultation on field control of Taeniasis and Echinococcosis Report. Nairobi, 1976.

- Adamolekun Band Meinardi H. Problems of drug therapy of epilepsy in developing countries. *Trop Geogr Med* 1990; 42: 178-81.
- Arfan F. Selective Primary Health Care: Strategies for control of disease in the developing world XII. Ascariasis and Trichuriasis. *Rev Infect Dis* 1984; 6: 364-73.
- Coker-Vann M, Brown P, Gajdusek DC. Serodiagnosis of human cysticercosis using a chromatofocused antigenic preparation of *Taenia solium* cysticerci in an enzyme-linked immunosorbent assay (ELISA). *Trans R Soc Trop Med Hyg* 1984; 78: 492-6.
- Coker-Vann M, Subianto B, Brown P, et al. ELISA antibodies to cysticerci of *Taenia solium* in human populations in New Guinea, Oceania and Southeast Asia. *Southeast Asian J Trop Med Public Health* 1981; 12: 499.
- Diwan AR, Coker-Vann M, Brown P, et al. Enzyme-linked immunosorbent assay (ELISA) for the detection of antibody to cysticerci of *Taenia solium*. *Am J Trop Med Hyg* 1982; 31: 364-3.
- Gryseels B, Gigase PL. The prevalence of intestinal parasites in two suburbs of Kinshasa (Zaire) and their relation to domestic water supplies. *Trop Geogr Med* 1985; 37: 129-32.
- Gunawan S. Central highlands of Irian Jaya. paper presented on Colloquium on "Ernährung und körperliche Befunde bei den Mek und ihren Nachbarn" Berlin, 1979.
- Gunawan S, Subianto DB, Tumada LR. Taeniasis and cysticercosis in the Paniai lakes area of Irian Jaya. *Buletin Penelitian Kesehatan* 1976; IV(1&2): 9-17.
- Gupta MC. Effect of ascariasis upon nutritional status of children. *J Trop Pediatr* 1990; 36: 189-91.
- Hadidjaja P. Beberapa kasus Taeniasis di Jakarta: Cara Diagnosa dan Pengobatan. *MKI* 1971; 173-8 [Several cases of taeniasis in Jakarta: Diagnosis method and treatment].
- Subianto DB, Tumada LR, Margono SS. Burns and epileptic fits associated with cysticercosis in mountain people of Irian Jaya. *Trop Geogr Med* 1978; 30: 275-8.
- Pun KK, Wong WT. Successful treatment of neurocysticercosis with low-dose praziquantel. *Trop Geogr Med* 1984; 36: 303-04.
- Stephenson LS, Crompton DWT, Latham MC, Schulpen TWJ, Nesham MC, Jansen AAJ. Relationship between *Ascaris* infection and growth of malnourished preschool children in Kenya. *Am J Clin Nutr* 1980; 33: 1165-72.
- Subianto B. Laporan singkat penyebaran Taeniasis dan Cysticercosis *cellulosae* di pegunungan Jayawijaya. Dipresentasikan pada Rakerkesda propinsi Irian Jaya 1978 (A short report on the spread of taeniasis and cysticercosis *cellulosae* in the Jayawijaya highlands. Presented in the Irian Jaya province meeting, 1978).
- Thomas H, Andrews P. Praziquantel-A new cestocide. *Pestic Sci* 1977; 8: 556-60.
- Purnomo, Partono F, Soewarta A. Human intestinal parasites in Karakuak, West Flores, Indonesia and the effect of therapy with mebendazole and pyrantel pamoate. *Southeast Asian J Trop Med Public Health* 1980; 11: 324-31.
- Venkataraman S, Vijayan GP. Uncommon manifestation of human cysticercosis with muscular pseudohypertrophy. *Trop Geogr Med* 1983; 35: 73-17.
- Woo, E, Yu YI, Huang CY. Successful infract precipitated by praziquantel in neurocysticercosis-A cautionary note. *Trop Geogr Med* 1988; 40: 143-6.