

# CESTODES IN MAN IN INDONESIA

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## ABSTRACT

Cestodes are found endemic in certain areas of Indonesia. The most common cestodes found are *Taenia saginata* and *Taenia solium*. Eggs of *Taenia* are found in stool samples during surveys in Irian Jaya (2-9 %), Nusa Tenggara Timur (7 %), Bali and resettlement areas of people from Bali (0,4 - 3,3%). Interviews, with questions concerning expelled segments, recovered a prevalence of 9,5 % in inhabitants of the island of Samosir (North Sumatra) and 2 % in the people of 6 villages in Abiansemal (Bali). Cases are also reported from Jakarta. *Hymenolepis nana* (0,2 - 1%) and *Hymenolepis diminuta* (0,4 %) are rarely found in surveys. A case of hyperinfection with *H. nana* has been reported in Jakarta in 1968. Occasionally there are reports of infections with *Dipylidium caninum*, *Raillietina madagascariensis*, *Bertiella studeri* and *sparganum*.

Report on treatment of taeniasis in Indonesia mentioned the use of atabrine, mebendazole, bithionol and praziquantel with different results.

## INTRODUCTION

*Taenia saginata* and *Taenia solium* are important pathogenic Cestodes, found in man in Indonesia. Both tapeworms are found endemic in areas where certain dietary habits and low level of sanitation are present, causing the perpetuation of the disease in the community.

Surveys during the last twenty years in some areas of Indonesia, showed prevalences varying from 0,4 - 9,5 %. Cases were reported from time to time, especially from Jakarta.

Eggs of *Hymenolepis nana* and *Hymenolepis diminuta* were sometimes found in stool samples, collected during surveys for intestinal parasites.

*Dipylidium caninum*, *Bertiella studeri*, *Raillietina madagascariensis* and also *sparganum*

are Cestodes rarely reported in Indonesia.

Treatment with atabrine, bithionol, mebendazole and praziquantel are given, depending on availability of the drug.

In this review some epidemiological aspects of tapeworms and its control in Indonesia will be discussed.

## COMMON CESTODES

*Taenia saginata* and *Taenia solium*

### 1. Geographic distribution

*Taenia* eggs were found in 16 stool samples (9 %) collected from hospitalized patients in Enarotali, Irian Jaya. Six stool samples (8 %) of 74 out-patients were found

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positive with *Taenia* eggs. All cases were probably taeniasis solium. Local people had only pigs; a few cows were owned by newcomers in this area<sup>1</sup>.

A report from Obano, another village of Irian Jaya, mentioned the findings of 2 % *Taenia* eggs in 350 samples<sup>2</sup>. Among 314 stool samples examined in Ambarita, Samosir, North Sumatra 2 % were found positive with *Taenia* eggs<sup>3</sup>. A survey in Timor, East Nusa Tenggara revealed a prevalence of 7 % in 445 stool samples<sup>4</sup>.

Several surveys have been done in Bali and in re-settlements areas of people from Bali. Simanjuntak et al.<sup>5</sup> examined stool samples from 3 villages in Bali. In Trunyan 1 (0.8 %) was found positive with *Taenia* eggs among 133 samples, in Sukawati 4 (2,1 %) among 199 samples and in Padangsembian 7 (3.3 %) among 216 samples.

In other villages of Bali eggs and/or segments were found in stool samples; in Mendayo 1,1 % of 143 samples were positive, in Kutu Tambahan 0,4 % of 123 samples, whereas in Bungaya 1,1 % of 88 samples<sup>6</sup>.

In resettlement areas of people from Bali i.e. in Seputih Raman, Central Lampung, 5 (1,1 %) were positive with eggs and/or segments. In Werdhi Agung, North Sulawesi, *Taenia* eggs were found in one sample (0.4 %) among 245 samples<sup>6</sup>. During a survey, using questionnaires, on the island of Samosir, Sumatra Utara, 9.5 % of 285 persons reported having expelled *Taenia* segments. The adult worms, obtained after treatment, were diagnosed as possibly *Taenia saginata*<sup>7</sup>. Interviews, asking for expelled segments, recovered a prevalence of 2 % in 2538 inhabitants of 6 villages, in the district of Abiansemal, about 12 km north of Denpasar<sup>8</sup>. It is known that examination of stool samples is not sufficient to detect every person infected by *Taenia*. Therefore, during the survey in

Obano, Irian Jaya, a serological test was carried out, using the counter-immunoelectrophoresis test (CIEP). The test showed a correlation between clinical signs and symptoms and serological positive rates. Precipitin antibody was detected in all eight persons with palpable subcutaneous cysts and in 77,3 % of the 22 cases suffering from epileptiform seizures during the past. Of the group, 77 persons without overt clinical symptoms, 22,5 % were positive<sup>9</sup>.

## 2. Case reports

*Taenia saginata* was first reported in Dutch residents in Magelang, Central Java<sup>10</sup>. A case of a woman with *Taenia solium* from West Kalimantan was described by Bonne<sup>10</sup>. Ngoerah<sup>11</sup> reported 4 cases from Bali who were assumed to be suffering from cysticercosis of the central nervous system. Signs of mild meningitis, epileptic seizures and cysts in muscles and subcutaneous tissue, were present in this woman. During the years 1962 till 1970 sixteen cases with taeniasis were diagnosed and treated at the Department of Parasitology, Faculty of Medicine, University of Indonesia in Jakarta. Six cases were infections with *Taenia saginata*, 7 cases with *Taenia solium* and 3 cases with unidentified *Taenia*<sup>10</sup>. During the last years, every year, about 6-8 cases were found at the same laboratory in Jakarta. In the year 1988 7 persons, consisting of 5 males and 2 females, were found infected with *Taenia saginata*. Two of the patients were non-Indonesians (unpublished data, 1989).

A case of cerebral cysticercosis was described by Lie et al.<sup>12</sup>. The case was a woman, 42 years old, from Chinese descent, who had insomnia and was feeling very weakly. Additional neurological and psychiatric signs and symptoms were later

found. The result of operation revealed many cysts in the brain and the diagnosis was established by histo-pathological examinations. The other case was a male, 35 years old, from Irian Jaya, who suffered from epileptic seizures. Operation was necessary, because of severe burns on his leg. He died after the operation and an autopsy was performed, exposing many cysts on the surface and inside the brain<sup>13</sup>.

### 3. The prevalence in different age groups

Higher prevalences are usually found in adult age groups, probably because meat is more consumed by adults. A survey in Timor, East Nusa Tenggara, showed the highest prevalence rate in the age group of 30-39 years (13 %), followed by the age group of 20-29 years (11 %) and 40-49 % (10 %). The lowest prevalence rate (1 %) was found in the age group 0-9 years<sup>4</sup>.

In Bali, in the village of Padangsambian, the highest prevalence rate was in the age group of 40-49 years (5 %) and in Sukawati in the age group of 30-39 years (7.7 %), whereas in Trunyan taeniasis was only found in the age group of 30-39 years i.e. 3.6 %<sup>5</sup>.

On the other hand another survey, using questionnaires, mentioned the highest prevalence rate in the younger age group. The highest prevalence rate was 3.7 % among the age group 0-9 years in Abiansema, Bali. Among 52 cases with taeniasis 4 cases were children below the age of 5 years<sup>8</sup>.

The youngest child, infected with *Taenia*, found by Simanjuntak et al.<sup>5</sup> was one and a half years old. Among 16 cases, described by Hadidjaja<sup>10</sup> 3 cases were children, 3 1/2, 8 and 9 years old.

### 4. Prevalence according to age

Prevalence rates are usually higher in the group of males in comparison with the group

of females, although the difference is not distinct.

Carney et al.<sup>4</sup> mentioned 8 % for males and 5 % for females. A higher prevalence rate in man was also found by Widjana and Kapti<sup>8</sup> : 2.6 % for males and 1.5 % for females. In the year 1962 taenia infection was recorded in 24 males and 4 females in a hospital in Bali; in the year 1963, 43 male patients and 10 female patients were treated, whereas in the year 1964 58 male and 20 female patients were recorded<sup>11</sup>.

Among 13 cases observed in a hospital in Irian Jaya during a period of a half year, 13 cases with cysticercosis were males and 8 cases were females<sup>1</sup>. It was suggested by Subianto et al.<sup>14</sup> that the difference in prevalence rates could be caused by different eating habits, such as : the brains of the pork, possibly sometimes with many cysts, are given to the males, whereas females obtain the intestines.

### 5. Religion and habits in connection with prevalence

The existence of taeniasis is also associated with habits. The inhabitants of the mountains of Irian Jaya cook their pork on plate-like hot stones, together with cassava and its leaves. As a result the pork is not well cooked and become the source of *Taenia solium* infections.

In Bali a food dish, called "lawar", a mixture of pork, beef or chicken with vegetables and spices, is usually consumed uncooked or not well cooked, during religious ceremonies. However, at the present time "lawar" is sold in the markets for general purposes. A survey on food habits was conducted, using 38 respondents, heads of the family. Among the respondents 34 (89,5 %) gave the information that most of the family

liked to eat "lawar", 2 (5,3 %) answered that few members of the family liked to eat this dish and 1 (2,6 %) said that the whole family did not like "lawar"<sup>8</sup>.

#### 6. Impact of education and socio-economic level

Not a single case of taeniasis was found among 155 inhabitants with high school education, whereas 52 of the cases infected with *Taenia* were illiterate or had primary school education only<sup>8</sup>.

Difficulties arise in the control of taeniasis in areas inhabited by people with a low educational and socio-economic level such as in the mountains of Irian Jaya.

#### 7. The influence of climate and environment

In a hot tropical country people are not hesitating to defecate outside the house, in the open air. In villages of Bali only 9 (23.7 %) of 38 families have a latrine. Most of the families defecate in the "teba", a small alley in the back yard of the house, used for rearing pigs. The other families consider the river as their latrine<sup>8</sup>.

## UNCOMMON CESTODES

### *Hymenolepis nana*

Infection with *H. nana* was reported in a man from Medan by Snijder (1921, quoted by Tjiong)<sup>15</sup>. Other cases were described occasionally (Pruis, 1933, Beukema, 1941, both quoted by Tjiong)<sup>15</sup>.

A survey in the area of Medan found 1 % of 1350 individuals positive with *H. nana* eggs<sup>16</sup>. Another, more recent survey in Timor, East Nusa Tenggara, detected 1 (0,2 %) positive sample among 445 stool samples<sup>4</sup>. A higher prevalence rate was found

in Obano, Irian Jaya. Of 350 stool samples 19 (5.4 %) were positive with *H. nana* eggs<sup>2</sup>.

A case of hyperinfection with *H. nana* was described by Tjiong and Sri Oemijati<sup>15</sup>. The patient was a male, aged 24 years, originally from Aceh, was once a resident in Medan and lived afterwards in Jakarta. He was treated with a single dose of 800 mg quinacrine. A total number of 1115 worms were expelled.

During the years 1965 to 1988 10 cases of *Hymenolepis nana* were referred to the Department of Parasitology, Faculty of Medicine, University of Indonesia<sup>17</sup>.

### *Hymenolepis diminuta*

Kwo and Jo (1965)<sup>16</sup> described a child, age 3 years, infected with *Hymenolepis diminuta*. Treatment with niclosamide gave good results.

Three cases infected with *Hymenolepis diminuta* were detected during a treatment trial for taeniasis in Bali<sup>18</sup>. During a survey in the Luwu Regency, South Sulawesi, three cases (0,4 %) with *H. diminuta* infections were found among 659 people examined<sup>19</sup>.

### *Bertiella studeri*

Since 1931 till now 10 cases of infection with *Bertiella studeri* were reported. Seven of the ten children were living in Sumatra, one in Yogyakarta, one in Banjarmasin and one in Jakarta<sup>20</sup>. Worms, with or without scolex, were expelled after standard atabrine therapy. Contact with an orangutan was mentioned in one case.

More recently a child, infected with *Bertiella*, age 1 year and 10 months, from Kalimantan, was referred to our Department (unpublished data, 1987).

### *Raillietina madagascariensis*

Bonne and Mreyen (1940)<sup>21</sup> reported the first human case with *Raillietina* infection in Indonesia. The worms were found at an autopsy of a boy of Chinese descent, age 3 1/2 years.

Eight other cases were diagnosed and treated in our Department during the years 1972 and 1973. The children, ranging from 15 months to 3 1/2 years of age, were expelling moving organisms, like rice grains, since a few days to months. The patients were residents of Jakarta, although originally from different provinces of Indonesia<sup>22</sup>.

### *Dipylidium caninum*

This worm, usually found in dogs and cats, was detected in 2 cases by Muller, 1930 (quoted by Sri Oemijati and Lie)<sup>23</sup>.

### *Sparganum*

There were only 3 cases reported in Indonesia since the year 1910. Von Romer (1910) found a sparganum in the bladder and Bonne (1930) discovered this worm in the pulmonary artery at an autopsy (quoted by Sri Oemijati and Lie)<sup>23</sup>.

Bonne and Lie<sup>24</sup> found 2 living sparganums in the wall of the small intestine of a man, who died of tuberculosis. A cat was infected with the two sparganums and eggs were found in the stool after 27 days. Two worms, identified as *Diphyllbothrium*, was recovered from the cat after 42 days.

## CONTROL OF TAENIASIS

Many difficulties could be overcome, if the control of taeniasis is to be conducted systematically and consistently. Much attention should be given to environmental sanitation,

which depends on socio-economic factors, habits and climate of the area. Health education is a very important aspect, which should be developed through several mass media such as television, radio, newspapers, meetings.

Treatment of patients is not easy because drugs are often not available and procedure of treatment is not simple.

## TREATMENT

### 1. Atabrine

In the past Atabrine (nivaquine) was known as one of the effective drugs against taeniasis. At present this drug is not produced anymore by pharmaceutical companies; available Atabrine tablets, at present, are remaining drugs of several years ago.

Hadidjaja<sup>10</sup> used this anthelmintic to treat 16 cases with *Taenia saginata* or *Taenia solium* infections. Side effects consisting of nausea, vomiting, diarrhoea and weakness were observed. In Irian Jaya Gunawan et al.<sup>25</sup> treated 20 patients; the result was a cure rate of 85 % (17 cases).

In North Sumatra Kosin et al.<sup>7</sup> treated 48 cases. The total number of worms expelled was 75 of which 31 worms with scolex and 44 without scolex.

### 2. Bithionol

Kosin et al.<sup>26</sup> used bithionol, single dose, 20 gram without a fasting period. The total number of worms expelled by the 65 patients was 93. One person harboured 1-7 worms. Widarso Hs.<sup>18</sup> treated 31 patients with 20 mg or 40 mg bithionol, per kg body weight. After treatment 22 patients expelled segments; in 11 cases *Taenia saginata* was found, in 7 cases segments of *Taenia solium*, in 3 cases segments of *Hymenolepis diminuta*

and in one case segments of *Bertiella* sp. After 3-6 months 19 of 22 patients who expelled segments, were cured.

### 3. Mebendazole

This drug is used against several helminths e.g. soil-transmitted helminths, *Enterobius vermicularis* and also for *Taenia*. Sixteen patients with *Taenia* were treated with mebendazole. The dose was 300 mg, twice a day during 3 consecutive days. After 2 or 3 months 8 patients (50 %) did not expel segments anymore<sup>27</sup>.

### 4. Praziquantel

Koesharjono et al.<sup>28</sup> treated 24 patients in Simanindo, North Tapanuli, North Sumatra and 54 cases in Badung, Bali. The result in North Sumatra was a cure rate of 87.50 % (21 cases) and in Bali 70.37 % (38 cases). Side effects were found in 1 patient from North Sumatra, who had a headache and was feeling weak. Six persons from Bali had headache and nausea, whereas 4 persons complained of headache only. Side effects disappeared quickly.

## CONCLUSIONS

1. Surveys and other studies on taeniasis are limited in Indonesia; special attention should be given to North Sumatra and East Indonesia.
2. Species identification, followed by investigations on the life cycle, including the host, of *Taenia* worms found in North Sumatra and probably elsewhere in other islands of Indonesia, is important for the purpose of controlling the disease.
3. Although several drugs are effective for taeniasis, there are some constraints in using these anthelmintics for mass treat-

ment in Indonesia. Because of high cost, procedure of treatment is sometimes not simple and it is not available.

4. Besides *Taenia*, other Cestodes are occasionally reported in Indonesia.

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## QUESTIONS AND ANSWERS :

1. Question: Is the frequency of males infected with *Taenia* higher than in females caused by a custom habit in which males consume a larger portion of meat than females ? (or children ?)  
Is this true ? If true, is it only in Bali conditions ?
- Answer : May be e.g. in Irian : males get special parts of the meat like the brains; women get the intestines. Other reasons not known.  
Children usually eat less meat than adults.