

TAENIASIS IN INDONESIA WITH SPECIAL REFERENCE TO SAMOSIR ISLAND, NORTH SUMATRA

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Abstract. In Indonesia, taeniasis is endemic on the islands of Bali, Irian Jaya and Sumatra. The Balinese eat pork or beef raw in a dish called "lawar". Natives of Irian Jaya also have a custom of preparing and consuming raw pork. On Samosir Island in North Sumatra, undercooked pork is consumed in traditional ceremonies.

In Bali, the local people defecate into cages (called "teba") of domestic animals. In Irian Jaya, pigs are allowed to feed on human feces inside houses at night. The natives of Samosir Island defecate in their gardens and their feces are easily consumed by freely roaming pigs.

Since 1972, studies have been carried out on the epidemiology of taeniasis in North Sumatra. The *Taenia* sp. found on Samosir Island is morphologically identical to *Taenia saginata*. However, the local people seldom or never consume beef because it is very expensive, while pork is commonly consumed. The species and the natural intermediate hosts of *Taenia* sp. on Samosir Island are still under investigation.

INTRODUCTION

Taeniasis is found worldwide. The prevalence of taeniasis depends upon frequency of consumption of raw or undercooked pork or beef and the level of sanitation in various regions.

Taeniasis (*Taenia saginata* or *Taenia solium*) is endemic to Indonesia, Taiwan, Korea, China, Thailand, the Philippines and other countries in Southeast Asia.

Taenia saginata in Asia is somewhat of an enigma (Huang *et al*, 1966; Chung and Liu, 1970; Kosin *et al*, 1972; Cross, 1987; Fan *et al*, 1988) because in Taiwan, Korea, Indonesia and the Philippines people frequently eat raw or undercooked pork, but rarely eat beef.

In some endemic areas, both species of *Taenia* can be found. Taeniasis and cysticercosis are endemic in areas where raw pork or beef is consumed and where sanitation is poor. Food and water are easily contaminated under these conditions.

In Cheju Island, Korea, and in the northern part of China, pigs are reared in the toilets for preparing artificial fertilizer (Fan, 1988, personal communication), and taeniasis and cysticercosis are commonly found in humans (Soh, 1966).

TAENIASIS IN INDONESIA

The first report of taeniasis *saginata* in Indonesia was made by Luchtmans in 1867 in Netherlands in Malang, East Java. In 1940, Bonne found one case of taeniasis *solium* in a Chinese woman from Samarinda, Borneo (Hadidjaja, 1971). Today, taeniasis is endemic in Indonesia on the islands of Bali, Irian Jaya, Sumatra and Timor (Table 1).

Balinese prepare a special dish containing raw or undercooked pork or beef, called "lawar". The people usually defecate on the ground or in stables ("teba") of domestic animals located behind their houses (Koesharjono *et al*, 1987; Warudju, 1988).

Taeniasis *solium* is endemic to the mountainous areas of Irian Jaya (Tumada and Margono, 1973; Subianto *et al*, 1978; Tjahjadi *et al*, 1978). At least 9 percent of the population in the Paniai Highlands suffers from taeniasis (Tumada and Margono, 1973). The existence of taeniasis *solium* and cysticercosis among the natives of these highlands is closely related to their ceremonial customs of preparing and consuming raw and undercooked pork and the very poor sanitary conditions in their homes. The inhabitants of these mountainous areas "cook" pork with

Table 1

Religion and food habits in endemic areas of taeniasis in Indonesia.

Endemic areas	Religion	Animal foodstuff	<i>Taenia</i> sp. reported
Samosir	Christian	pig, dog, goat, cattle (rare)	<i>T. saginata</i> ? <i>T. solium</i> (rare)
Bali	Hinduism	pig, goat, cattle (rare)	<i>T. saginata</i> <i>T. solium</i>
Irian Jaya	Animism	pig	<i>T. solium</i>
Timor	Christian R Catholic	pig, goat, cattle	no report

cassava and its leaves by heating it with hot stones. As a result, the pork is undercooked (Margono, 1989).

In the highlands of Irian Jaya, pigs are reared in people's dwellings so that during the night they can eat human feces. This unsanitary habit, however, can result in cysticercosis in pigs (Vriend, 1979) and in humans by heteroinfection.

In North Sumatra, *T. saginata* and *T. solium* have been reported (Kwo, 1970; Hadidjaja, 1971) among the Bataks who live mainly on Samosir Island and in the Karo highlands.

TAENIASIS IN SAMOSIR ISLAND

Samosir Island is in the middle of Lake Toba in North Sumatra. The northern part of the island, known for its beautiful panoramic views, is popular with tourists. The island is 900 m above sea level and relatively cold and humid. The population of 100,000 people are farmers and fishermen.

Taeniasis on Samosir Island resembles taeniasis in Lanyu Island (Fan, 1988, personal communication). In Samosir Island, the local people usually defecate on the ground of their gardens and their compounds (Koesharjono, 1987); they also consume undercooked meats of many animals. Taeniasis, called "adeon", is a well known worm infestation among the local inhabitants.

Kosin *et al* (1972) reported a 9.5% rate of *Taenia* infections in inhabitants of the village of Ambarita on Samosir Island. Following treatment, adult worms expelled from 65 patients were morphologically identical with classical *Taenia saginata* (Table 2). When questioned, however, residents of Ambarita reported that they rarely or never consumed beef because it was very expensive. People preferred to eat pork, dog, sheep or goat meat. Since then, Kosin *et al* (1972) have attempted to identify the species of *Taenia* and its intermediate hosts on Samosir Island. Taeniasis was also found in other parts of Samosir Island (Depary, 1977).

Fan *et al* (1988) reported 15 cases of taeniasis on Samosir Island. Fourteen people admitted eating undercooked pork and dog meat and only one admitted eating beef. All tapeworms recovered from these cases were morphologically similar to *T. saginata*. Cross (1987) suggested that goats might be one of the natural intermediate hosts of *Taenia* sp. in North Sumatra; however, his suggestion has not been investigated.

The species of *Taenia* and its natural intermediate hosts on Samosir Island still need further investigation. The Samosir Island taeniid may be classical *T. saginata* using cows or water buffalo as intermediate hosts; however, Fan *et al* (1988) reported that cysticerci failed to develop in Holstein calves fed Samosir *Taenia* eggs. On the other hand,

Table 2

Taeniasis surveys in Samosir Island, North Sumatra Indonesia.

Year	Prevalence rate %	No. treated cases	No. worms collected (worm/patient)	Species
1972	9.5	65	93 (1-7)	<i>T. saginata</i>
1986	21	10	23 (1-9)	<i>T. saginata</i>
1987	17.3	42	56 (1-4)	<i>T. saginata</i> 55 <i>T. solium</i> 1

the Samosir *Taenia* may be a new strain of *T. saginata* that has become adapted to developing viable cysticerci in domesticated wild pigs on Samosir Island in North Sumatra.

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