Human and Animal Pentastomiasis in Malaysia: Review

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ABSTRACT

Pentastomiasis is a zoonotic parasitic disease induced by the larval stages of pentasomes. The disease has been reported in Africa, the Middle East, and Southeast Asia and caused by the nymphs of the two genera: Linguatula and Armillifer and the two species L. serrata and A. armillatus regard for more than 90% of human cases. The definitive hosts of Armillifer spp. are snakes, lizards, and other reptiles. The parasites live in the upper respiratory tracts and lay eggs that are passed out through respiratory secretions, saliva or feces. Intermediate hosts are humans, rodents, and other mammals. Humans incidentally acquire the infestation by the consumption of uncooked infected snake meat or by drinking water contaminated with ova of the pentastomes. In the intestinal tract, the larvae hatch from the ova, penetrate the intestinal wall and migrate to organs in which the liver is the most common site. In Malaysia, human pentastomiasis was reported among aborigines in Peninsular and East Malaysia. Armillifer moniliformis was identified in wild animals and carnivores with infection rate 1.8% and 20.7% respectively. In addition to that, a previous study has discovered the adults of pentastomes of A. moniliformis in two out of six snakes from species Python reticulates. Recently a case of human pentastomiasis was reported in Sabah, East Malaysia, caused by the nymph of A. moniliformis. Therefore, the aim of this review is to provide the latest updates on human and animal pentastomiasis especially in Malaysia.

Keywords: Pentastomiasis, human, animal, Malaysia

INTRODUCTION

Pentastomes are wormlike parasites (“tongue worm”), 3 - 13 cm in length. They have centrally located mouth surrounded by four hooks making they seem like they have five mouths hence the name “pentastomes”. Their body is segmented, forming annuli and covered in a chitinous cuticle [1] (Figure 1).

Adult parasites dwell in the upper respiratory tracts of the definitive hosts (snakes, lizards, and other reptiles), lay eggs that are passed out through respiratory secretions, saliva or feces. Humans, rodents, and other mammals act as intermediate hosts which acquired the infection by; drinking water contaminated with ova of the pentastomes, consumption of infected snake meat, handling infected snakes and harvesting skins of the infected snake (Figure 2).

Pentastomes are cosmopolitan and widely distributed especially in tropical and subtropical countries. Generally, the range of the natural hosts and the degree of water and food sanitation affect the distribution of these parasites [2].

In Malaysia, pentastomiasis was reported in both human and animals [3]. The disease is considered being neglected and less attention is given by the authorities. Therefore, the aim of this review is to provide the latest updates regarding human and animal pentastomiasis especially in Malaysia.

HUMAN PENTASTOMIASIS WITH LATEST REPORT IN MALAYSIA

Human pentastomiasis is a zoonotic parasitic disease, which human serves as an incidental host for the infection. Most of the cases are asymptomatic and discovered only during surgery or autopsy. Generally, the diagnosis is largely depends on parasitologic and histopathologic examination [4].

How to cite:
Historically, the first case of human pentastomiasis was reported by Pruner in Egypt in 1847 [5]. Following that, the disease has been reported sporadically in Africa, Middle East, and Southeast Asia and it was caused mainly by the nymphs belonging to genera; *Linguatula* and *Armillifer* [4, 5, 6-10]. The two species of the parasites; *Linguatula serrata* and *Armillifer armillatus* accounted for more than 90% of human cases [11]. To date, there are four species of *Armillifer* recorded in human infection; *A. armillatus* in Africa and the Arabian Peninsula, *A. agkistrodontis* in China, *A. grandis* in Africa and *A. moniliformis* in Southeast Asia [11, 12].

Human is a dead end host of pentastomes and acquired the infection by the consumption of uncooked infected snake meat or by drinking water contaminated with ova of the pentastomes. In addition to that, human has possibility to acquire the infection while handling, harvesting the snake’s skins or playing and touching the mouth of the pet snakes. In the intestinal tract, the larvae hatch from the ova, penetrate the intestinal wall and migrate to many organs in which the liver is the most common site [1].

Infection with pentastomids is mostly asymptomatic. However, in some cases, the clinical manifestations include fever, abdominal pain, vomiting, diarrhea, jaundice and abdominal tenderness [11]. In severe disseminated cases, the disease may lead to death [5, 13, 14]. According to Herzog *et al*. (1985) cysts could be serious enough to cause death [15]. However, the larvae are usually die and calcify within two years of infection [2].

In Malaysia, human pentastomiasis was reported in both Peninsular and East Malaysia [16-18]. In a series of 30 consecutive autopsies performed on aborigines from five different states in West Malaysia, pentastomid infection was found in 33.3% of the cases with the prevalence of 45.4% in adults with the liver and the lungs were the most infected organs [16].

The most recent infection of human pantastomiasis was reported in a 70 year old aboriginal farmer from Borneo in 2011 [19]. Most of the infections were caused by *A. moniliformis*. Table 1 shows the summary of human pentastomiasis cases in Malaysia.

<table>
<thead>
<tr>
<th>Species</th>
<th>Organ</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>A. moniliformis</em></td>
<td>Neck, abdomen</td>
<td>Rail, 1967 [18]</td>
</tr>
<tr>
<td><em>A. moniliformis</em></td>
<td>Liver, lung</td>
<td>Prathap <em>et al</em>., 1968 [14]</td>
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<tr>
<td><em>A. moniliformis</em></td>
<td>Chest, abdomen</td>
<td>Burnx –Cox <em>et al</em>., 1969 [17]</td>
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<tr>
<td><em>A. moniliformis</em></td>
<td>Liver, lung</td>
<td>Prathap <em>et al</em>., 1969 [16]</td>
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<tr>
<td><em>Armillifer</em> sp.</td>
<td>Fallopian tube</td>
<td>Ong, 1974 [20]</td>
</tr>
<tr>
<td><em>A. moniliformis</em></td>
<td>Liver</td>
<td>Latif <em>et al</em>., 2011 [19]</td>
</tr>
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### ANIMAL PENTASTOMIASIS WITH SUMMARY OF CASES IN MALAYSIA

Animals acquired the infection with pentastomids through ingestion of eggs in food and water contaminated by feces or nasal discharges of snakes, *Python* sp. [21] or by feces of lizards [22]. In Malaysia, pentastomiasis was reported in domestic animals such as dog and cat and in wide range of wild animals [23, 24]. Table 2 shows the summary of reported cases of animal pentastomiasis in Malaysia.

The genus *Armillifer* occurs as adults in snakes and...
infected mammals, reptiles, and birds as intermediate hosts [3]. Honjo et al. [25] and Burnx-Cox et al. [17] reported *A. moniliformis* in cynomolgus monkey, *Macaca irus* while Lim and Krishnasamy [26] reported heavy infestation in giant rat *Rattus bowersi* with the larval stage of *A. armillatus*. The same authors found that *A. armillatus* is common among bats, rats, squirrels, and carnivores from the study conducted in West Malaysia.

Besides, Lim and Yong found *Raillietiella hemidactylti* in four species of house geckoes, namely: *Hemidactylus frenatus, Platyurus platyurus, Gehyra mutilate* and *Gekko monarchus* [27]. The prevalence of infection in latter was high in two species of house geckoes, *Hemidactylus frenatus* and *Platyurus platyurus* from the shop houses. The high prevalence in geckoes of shop houses was attributed to the presence of intermediate insect hosts, particularly cockroaches which are abundant in these shop houses due to the availability of food and poor sanitation in these places. In addition to that, Jeffery et al. found *Raillietiella sp.* in the lungs of 5 out of 9 geckoes, *Gekko smithii* [28].

Other than geckoes, cockroaches are also common and closely associated with human dwellings in Malaysia. Previous studies recorded the recovery of *Momiliformis moniliformis* larva in the American cockroach, *Periplaneta americana* [33, 29]. This is interesting since the researchers found the remains of *P. americana* in the stomach of house geckoes [22].

Adult pentastomids in the gecko’s lung produce eggs which are passed out with feces. Cockroaches and other coprophagous insects ingest the feces of geckoes, and the eggs will hatch into larvae and settled in their bodies. Lizards become infected with pentastomids when they ingest the infected insects. Meanwhile, there is a possibility of geckoes to transmit the infection to humans through feces which contaminate food and utensils.

Pentastomiasis was also reported in wild animals. Krishnasamy et al. found that out of 5209 wild animals of 33 species in West Malaysia, 92 (1.8%) were infected with nymphal stages of *A. moniliformis* [3]. The infection rate of the wild animals and carnivores with *A. moniliformis* was 1.8% and 20.7% respectively.

The occurrence of a nymph stage of *A. moniliformis* in a fruit-eating bat *Cynopterus brachyotis* was reported by Krishnasamy et al. [30]. The parasite measured 15 mm in length and 1.58 mm in width and had 31 annuli. The larval stages of *A. moniliformis* were found in two banded palm civet, *Hemigalus derbyanus*, and they are considered as a new host for the parasite [3]. The same authors identified 12 species of Malaysian pentastomids in a variety of animals.

In 1981, Krishnasamy et al. recovered the adults of *A. moniliformis* from two out of six *Python reticulates* [24]. Another finding of *A. moniliformis* in pythons was reported in 1986, when Krishnasamy et al. found the adult of *A. moniliformis* from the respiratory tracts of 6 out of 7 pythons (*P. reticulates*) in study involving zoo animals [35]. The latter study also reported discovery of the nymphs from the liver and the kidney of a lar gibbon (*Hylobates lar*) and meerkat (*Suricatasyricata*) respectively. In addition to that, the pentastomes parasites were also reported in other animals such as the smooth otter [31], toad *Bufo*...


**REFERENCES**


