



Eurytrematosis: a Review of the Pancreatic Fluke

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Abstract

Eurytrematosis is a common zoonotic disease has emerged as a major species causing veterinary disease and public health problem. This review examines recent advances in *Eurytrema* species, the life cycle, intermediate hosts required for completing the life cycle, and geographical distribution of *Eurytrema* species in the world, as well as several factors considered suitable to occur.

Keywords: *Eurytrema* spp., pancreas, life cycle, distribution, zoonosis

Background

Eurytrema spp. is one of the major trematode pancreatic fluke causing substantial economic losses in ruminants. Infection by *Eurytrema* spp. caused a disease is called eurytrematosis. The normal tropism (predilection site) of the parasitic stages of *Eurytrema* spp. is in the biliary or pancreatic duct of ruminants. Infection with *Eurytrema* spp. can have a detrimental effect on animal health, leading to clinical and sub-clinical diseases, that many result in financial lose and overall decreased productivity. *Eurytrema* spp. is responsible for retardation of growth of young animal, progressive weakness, reduced weight gains, feed conversion, malnutrition and decreased milk production.

Regarding to some reports indicate that eurytrematosis is prevalent within some parts in the world. This reflect that the disease was endemic in worldwide. *Eurytrema* spp. was considered as one of the most common fluke in ruminants. It has been well-known that *E. pancreaticum* is an internal parasitic helminth in the pancreas of goats (Sangvaranond *et al.*, 2010), cattle (Jiraungkoorskul *et al.*, 2005), sheep (Xu *et al.*, 2013; Dorny *et al.*, 1996), and camel (Nakayima *et al.*, 2017). Schwertz *et al.* (2015) described that *Eurytrema* spp. fluke was found in amount of 92% of cases died cattle. In the study of Pinheiro *et al.* (2015) analyzed of the eggs and miracidia of *E.*

coelomaticum that were collected from the pancreas of naturally infected cattle.

Eurytrematosis not only reduce productivity of ruminants, but also require public health attention as zoonosis. In the circumstance conditions, *E. pancreaticum* accidentally infects cats and humans. In Korea, Chai *et al.* (2013) described that the fluke prevalent in stray cats, *Felis catus*. More previously study of occurrence of *E. pancreaticum* infection was found amount of 15 adult flukes localized in pancreatic ducts of a 70-years-old Japanese woman in Fukuoka Prefecture, Japan was reported by Ishii *et al.* (1983). This review therefore examines recent advances in understanding the pancreatic fluke and their distribution in some parts of the world.

Discussion

Eurytrema Species

Eurytrematosis, a disease caused by pancreatic flukes, *Eurytrema* spp. There are many of fluke members of the genus *Eurytrema* (Class: Trematoda, Family: Dicrocoeliidae) have been identified as the most serious internal parasite problem of ruminants in the world. Base on typical morphological characteristics and molecular properties, *Eurytrema coelomaticum* has been identified in cattle from southern Bazil (Figueira *et al.*, 2014). Similarly, Mohanta *et al.* (2015) have been confirmed the existence of *Eurytrema cladorchis* fluke

recovered from the bile duct of cattle (*Bos indicus*) in Bandarban, a hill district in Bangladesh. The complete mitochondrial genom of *Eurytrema pancreaticum* sequenced by Chang *et al.*, 2016. Previously, Xu *et al.* (2013) characterized the miRNA profiles of *E. pancreaticum* in Daqing City, Heilongjiang Province, China. More previously, based on morphological features Mirza and Kurniasih (2002) has been identified *Eurytrema* spp., *E. dajii*, and *E. pancreaticum* infection in cattle in Indonesia.

Life Cycle and Intermediate Hosts

Eurytrema spp. adult worms release the eggs into the environment through feces from the infected animals. To complete its life cycle, the parasite requires two intermediate hosts namely *Bradybaena similaris*, a land snail as the first one and locusts (grasshoppers) such as *Conocephalus gladiatus* and *Conocephalus maculatus*, of the Tettigoniidae family as the second one (Jang, 1969; Pinto and Melo, 2016). The land snails ingest the faeces of the definitive hosts containing parasite eggs. After feeding, the eggs with open operculum formed miracidia in the lumen, and penetrated to the midgut tissue through the gland cell layer of snail. Miracidia hatch and developed mothers and daughters to produced cercariae that expelled from the snail in the environment. The cercariae ingested by the second intermediate host and formed metacercariae in site the body cavity of grasshoppers (Schwartz *et al.*, 2015). Domestic ruminants are usually infected by ingestion the second intermediate host having metacercariae while grazing. Exclusively, the ruminants could eat the infected intermediate hosts because the grasshoppers infected by the fluke suffer a paralyzing, very weak and could not jump away. When grasshoppers ingested by a bovine, metacercariae established in the small intestine, and penetrate the wall. The fluke migrate from the small intestine of the sheep to the pancreas through the peritoneum. The young fluke will migrate through the pancreatic tissue before entering the biliary or pancreatic duct and developing

to a reproductively capable adult (Jang, 1969; Schwartz *et al.*, 2015).

The Distribution of Eurytrematosis in The World

This parasite is reported to occur in many countries around the world. Reference to *Eurytrema* spp. common parasite the pancreatic duct of cattle has been reported in Brazil (Schwartz *et al.*, 2015). Various study of occurrences of *E. pancreaticum* prevalent in Korea (Jang, 1969), China (Xu *et al.*, 2013), India (Lalrinkima *et al.*, 2016), Thailand (Sangvaranond *et al.*, 2010; Jiraungkoorskul *et al.*, 2005), Japan (Ishii *et al.* 1983), including Indonesia (Wiroreno *et al.*, 1987; Dorny *et al.*, 1996). In the study of Okajima *et al.* (2016) explained that eurytrematosis was endemic in Japan particularly in Kagoshima, Okinawa, and Shimane regions. In another study showed that *E. pancreaticum* eggs appeared in fecal samples of five camels in Karamoja sub-region of North-eastern Uganda (Nakayima *et al.*, 2017). The disease has been considered endemic in the North Sumatra Province, where 23,3% of the examined sheep from Medan abattoir North Sumatra, Indonesia was infected by *E. pancreaticum* (Dorny *et al.*, 1996).

Several Factors Influenced The Eurytrematosis Distribution

The prevalence of *Eurytrema* spp. in the world is probably attributed by several factors needed for the prevalence with pancreatic fluke to occur. The presence of infected animal should be understood that the pancreatic fluke is favourable for reproducing in various species other than cattle. *E. pancreaticum* has also been found to occur in the biliary duct of sheep, cats, goats, camel, and man (Sangvaranond *et al.*, 2010; Ishii *et al.* 1983; Dorny *et al.*, 1996; Bassani *et al.*, 2006; Chai *et al.*, 2013; Nakayima *et al.*, 2017). Importantly, this various potential hosts and the increase in mobility of the definitive host population, makes most grazing areas potentially infected. However, many of land snails which are distributed across country can act as first intermediate host of *Eurytrema* spp. Moreover, *Eurytrema* spp. transmission and

infection in intermediate and definitive host are strongly mediated by environmental factors. For the development and survival, the snails need the ideal of temperature, light, humidity, and rainfall. Therefore, in tropical region like Indonesia provide the favorable environmental factors that enhance the intermediate host population. During the wet season provide ideal habitats for snails to breed and grew much favor. Rainfall is probably the most important climatic factor affecting snail distribution. Because of this, snail population increased dramatically. Indeed, geographically condition of Indonesia provide ideal breeding place for grasshoppers. Farming system and changing environmental condition greatly increase the population of grasshopper in Indonesia.

There are numerous studies regarding the effect of seasonal variation in the distribution of parasites. Aktaruzzaman *et al.* (2013) explained that the higher prevalence of Fascioliosis in rainy season compared with in winter and summer seasons in cross breed cattle in Sirajganj District, Bangladesh. Velusamy *et al.* (2014) described that the prevalence of haemoprotozoan parasites particularly theileriosis was high during summer in Western part of Tamil Nadu, India. Baines *et al.* (2015) described that the high prevalence of fluke eggs in elephants is notable and could be due to the warm and wet conditions in the Okavango Delta, Botswana. Recently, under fecal egg count experimental conditions Singh *et al.* (2017) demonstrated that there were shown in the favorable climatic condition particularly in the monsoon season, the parasitic infection in small ruminants is the highest prevalence compared with the winter and summer season in the western zone of Punjab, India.

Conclusion

Eurytrema spp. infection is a parasitic disease in ruminants and to be considered a zoonotic disease because a number of people could be parasitized with this fluke. The disease caused by *Eurytrema* spp. infection is called eurytrematosis. The disease constitutes the major health problem caused by pancreatic fluke, which is

endemic in the some parts in the world. The distribution of eurytrematosis in some countries was influenced by several factors such as the first and second intermediate host existence as well as a favorable climatic condition.

Recommendation

The author recommend that research into eurytrematosis must be amplified in Indonesia to provide substantial information that can help in better understanding of eurytrematosis, to support effective and efficient strategies for developing management guidelines for the control of eurytrematosis.

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