Tropical Medicine & Surgery
ISSN: 2329-9088

Oryan et al., Trop Med Surg 2015, 3:1
DOI: 10.4172/2329-9088.1000e123

Editorial Open Access

Public Health Concerns of Taenidae and Their Metacestodes

Oryan A* **and Alidadi S**

Department of Pathology, School of Veterinary Medicine, Shiraz University, Shiraz, Iran

***Corresponding author:** Oryan A, Department of Pathology, School of Veterinary Medicine, Shiraz University, Shiraz, Iran; Phone: +45 3862 3032 ; Fax: +45 3862 6974 ; E-mail: oryan@shirazu.ac.ir

Received date: November 01, 2014, **Accepted date:** November 07, 2014, **Published date:** November 13, 2014

Editorial

Tapeworms of the family Taeniidae are transmitted from the definitive hosts such as carnivores to the intermediated hosts including herbivores or omnivores and human beings via oral-fecal cycle [1,2]. This family includes two major genera namely Taenia and Echinococcus. The Taenia species include *T. saginata*, *T. solium*, *T. asiatica*, *T. hydatigena*, *T. ovis*, *T. multiceps*, *T. serialis*, *T. pisiformis*, *T. taeniaeformis*, and *T. crassiceps* [2,3]. In many endemic areas the diseases caused by the genus Taenia in humans are often categorised as neglected tropical diseases [3]. In general, the larval stages or metacestodes belonging to these tapeworms include hydatid cyts, cysticerci and coenuri [2]. All these species except for *T. hydatigena* (*C. tenuicollis*), *T. ovis* (*Cysticercus ovis*) and *T. pisiformis* (*C. pisiformis*), cause zoonotic parasitic diseases and thereby are of public health importance [2-5]. Humans acquire infection by inadvertent consumption of ova or larval stages (metacestode) present in undercooked meat [3]. Cysticerus bovis, the metacestode of *T. saginata*, occurs only in beef and humans are only the definitive hosts and receive the infection by ingestion of the raw meat containing the cysticeri [1,6,7]. Neurocysticercosis is regarded as the most common zoonotic parasitic disease of the central nervous system (CNS) caused by *T. solium* metacestodes called *Cysticercus cellulosae* affecting human beings as the definitive and also aberrant hosts [7,8]. Indeed, human acquire this metacestode via ingestion of undercooked pork infected with cysticerci. On the other hand, the eggs hatched in the human intestine can finally produce the cysts in areas with high blood flow such as CNS (neurocysticercosis), the muscles (human cysticercosis), the subcutaneous tissue and the eye (subcutaneous and ocular cysticercosis, respectively) [5,8]. *Taenia asiatica*, also known as Asian Taenia, similar to *T. saginata* is responsible for intestinal teniasis and has been identified in several Asian countries [3,9]. Cysticercus fasciolaris is the larval stage of the cestode *T. taeniaeformis* in wide variety of small rodents, and occasionally birds and humans, as intermediate hosts with cats as the definitive hosts [10]. Adult forms of *T. taeniaeformis* and *C. fasciolaris* have been recognized from the intestine and liver of humans, respectively. Nonetheless, it seems that these cestodes are associated with low health risk to humans [10]. Coenurosis occurs in cerebral and non-cerebral forms. The former is caused by the larval stage of *T. multiceps* which possesses a metacestode stage namely Coenurus cerebralis [2,11,12]. *T. gaigeri* with its metacestode termed *C. gaigeri* causes non-cerebral coenurosis with cysts in the muscles of the intermediate hosts including herbivores as well humans [12-15]. It is unclear and debatable that *C. cerebralis* and *C. gaigeri* are the same or different species and the researches are focusing and performing detailed studies to answer this question [11,12]. Coenurus serialis, the larval stage of the cestode *T. serialis* are found as fluid-filled cystic masses in the muscles and subcutis of rodents and rarely humans as the intermediate hosts. This cestode, in many characteristics, is similar to T. multiceps [16]. *T. crassiceps* is intestinal tapeworm of carnivores forming the cyst-like larvae or metacestodes (cysticerci) in the body cavities and subcutaneous tissues of rodents as the intermediate hosts [3,17]. The muscles and subcutis of the immunosuppressed humans and the eye and cerebellum in immunocompetent ones are involved by the cestode larvae as tumor-like masses [17]. Four Echinococcus species are known to infect the human hosts during their larval stage including *E. granulosus*, *E. multilocularis*, *E. oligarthus*, and *E. vogeli* that the latter two species are associated with neotropical echinococcosis [18].

Hydatid disease or cystic echinococcosis is caused by the larval stage of *E. granulosus* associated with the existence of the cysts in visceral organs especially the liver and the lungs [2,19]. This cestode with its metacestode is recognized as the most important helminthic zoonoses and is of great public health and economic importance especially in tropical and developing countries [19,20]. Considering to its importance, treatment modalities for patients with the disease include chemotherapy via albendazole and mebendazole or praziquantel, puncture aspiration injection reaspiration (PAIR) and surgery [20,21]. Alveolar echinococcosis, a parasitic disease with public health importance, is caused by the cestode *E. multilocularis* transmitted between intermediate hosts such as rodents and definitive host including wild carnivores especially foxes. In humans, the metacestodes proliferate and form tumor-like masses causing organ dysfunction [22,23]. The disease if remains untreated, can lead to the death of the patient due to unlimited proliferation and metastasis of the lesions [23]. Polycystic echinococcosis caused by the metacestodes of *E. vogeli* and *E. oligarthus* is regarded as an emerging parasitic zoonotic disease with public health concern in the humid tropical rainforests [24]. The intermediate hosts for *E. oligarthus* include wild rodents with the development of cysts in the muscles, subcutaneous tissues or lungs, liver and spleen. In human cases, they have been found in the heart muscle, behind the eyes and the liver [18]. Diagnostic methods mostly include serologic tests such as ELISA, imaging and scanning techniques like magnetic resonance imaging (MRI), computed tomography (CT) and ultrasound [21]. Given high public health significance of these tapeworms, it needs to control. An effective preventive program and also early diagnosis should be designed and implemented and an appropriate treatment is necessary. Development of an effective, safe and cheap vaccine against the parasites can be helpful [5,21]. On the other hand, close proximity of the final hosts such as dogs to humans in these cases may be a main factor in the occurrence of human cases of the disease [23,25]. Therefore, dogs should be considered as the main source of infection and the major risk factor. The big problem for control of these diseases is reducing the risk factors including access of the stray dogs and other wild carnivores to the infected carcass wastes, consumption of raw meat and unwashed vegetables, poor sanitation, use of human feces as fertilizer, and inadequate meat inspection [2,5]. Regular deworming of carnivorous pets and repeated treatment of dogs (the major final host

in most cases) with anti-parasitic agents, public awareness of different ways of parasite transmission, accuracy in carcass inspection, health education for dog owners, proper condemnation of the infected carcass to reduce the stray dog population, all can be useful in reducing the prevalence and incidence of these zoonotic parasitic diseases [2,4,5,25].

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