

## Review on Taeniasis and Its Zoonotic Importance

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**Abstract:** Taeniasis and cysticercosis are the major parasitic infection of humans and animals caused by adult and larval stages of tapeworms, respectively. Among those, *Taenia solium* (*T. solium*) and *Taenia saginata* (*T. saginata*) species are zoonotic importance. In the natural cycle of these tapeworms, adult tapeworms are found in the definitive host while the cysts (Cysticerci) are found in the intermediate hosts. The disease has worldwide occurrence especially where cattle and pigs are present. The disease has both public and economic importance by causing organ condemnation and cause economic loss by quality down grading of meat, cost of refrigeration, cost of human therapy and lowering productivity. The prevalence of the disease varies between countries and different regions of the country. In developing countries the prevalence of the disease is high due to several reasons. Among them keeping the definitive host in close association and lack of awareness of the people about the role of offal and raw meat in transmitting the disease from intermediate host to final host can be illustrated. Control and prevention is achieved by protection of cattle/pig from grazing on feces or sewage polluted grass, not using untreated human feces as fertilizer for pasture land, avoid eating of raw or under cooked meat and deep freezing. It is therefore important that sufficient emphasis should be given to this problem so as to improve health, quality and quantity of beef/pork that may satisfy the domestic requirements and increase foreign export revenue.

**Key words:** Cattle • Cysticercosis • Pig • Taeniasis • Zoonosis

### INTRODUCTION

Animal diseases are one of the most important constraints to increase productivity of food animals in all parts of the world. Parasitism is one of the major problems that affect the productivity of livestock worldwide. Among many parasitic problems of domestic animals, tapeworms are an economically important intestinal parasites found all over the world, which have infected human beings for thousands of years [1].

There are two kinds of taeniasis, one caused by *T. saginata* and the other by *T. solium*. Both infestations are indirect, as human beings acquire them by ingesting beef or pork infected with parasites. Human beings are the definitive host and the cows and pigs are intermediate hosts [2].

Taeniasis is the intestinal infection of human with the adult stage of the tapeworm of the genus *Taenia*. *Taenia* is a genus of tapeworm that includes some important parasites of livestock and humans. The members of the genus are responsible for taeniasis and

cysticercosis in animals and humans. The most important *Taenia* species are *T. solium* (Pork tapeworm) and *T. saginata* (Beef tapeworm), for which the larval stage of the parasite found in the intermediate host (IH) and, the adult is found in the definitive host (DH) [3].

Bovine and porcine cysticercosis (Beef/pork measles) is a zoonotic infection of socioeconomic importance caused by the larval stages of *T. saginata* and *T. solium* the intestinal cestode of humans that has cattle as intermediate hosts [4, 5].

The distribution of taeniasis is usually associated with under developing countries specially in the rural communities where man maintain close contact with pig, cattle and various domestic animals. The adult parasite is found in the small intestine of the DH while the metacestode is found in different organs of the IH. Infection is acquired by eating imperfectly cooked meat and pork and contaminated pasture by *Taenia* eggs [6]. About 100 million people worldwide may be infected with either *T. saginata* or *T. solium* [7].

In Africa, inadequate health education and low availability of taenicides are the major obstacles for the control of the disease [8, 9]. Therefore, the objective of this review is to provide an overview on the prevalence and economic and zoonotic importance of taeniasis in animals and humans.

## Literatures Review

### Taeniasis

**Etiology:** Taeniasis is the intestinal infection of human with the adult stage of the tapeworm of the genus *Taenia*. The most important causative agents are *T. solium* and *T. saginata* and their respective larval stages *Cysticercus cellulosae* and *Cysticercus bovis* [10]. *T. saginata* and *T. solium* and their metacestodes, *Cysticercus bovis*, *Cysticercus cellulosae*, belong to the class Cestoda, order Cyclophyllidea, Family Taeniidae and Genus *Taenia* [6, 9, 11].

**Morphological Identification:** *Taenia* species have three parts; strobila, neck and scolex. The adult *T. saginata* found in man only, ranges from 5-15 meters in length; the scolex, exception among the species of *Taenia*, has neither rostellum nor hooks; the uterus of gravid segment has 15-30 lateral branches on each side of the central stem in contrast to that of *T. solium* with only 7-12 lateral branches (Fig. 1). The adult *T. solium* is similar to *T. saginata* except that the scolex is typically taeniid, having a rostellum armed with two concentric rows of hooks [11].

The strobila of *T. saginata* is longer than *T. solium*; it is composed of 1000 to 2000 proglottids and is 4-10 meters long. The gravid proglottids, which can contain more than 100,000 eggs detached from the strobila one by one; they are motile and seek via the anal sphincter. Eggs are either expelled from proglottid or released when it disintegrates. In the bovine animals the mature cysticercus, *C. bovis* is grayish-white, about one centimeter diameter and filled with fluid in which the scolex is usually clearly visible. As in the adult *T. saginata*, it has neither rostellum nor hooks [12].

Table 1: Scientific classification of *Taenia* species

Kingdom	Animalia
Phylum	Platyhelminthes
Class	Cestoda
Order	cyclophyllidea
Family	Taeniidae
Genus	<i>Taenia</i>
Species	<i>T. solium</i> and <i>T. saginata</i>

Source: Soulsby [6] and Smyth [9]

Eggs passed in feces or discharged from ruptured gravid segments are subspherical to spherical in shape. The egg consists of the hexacanth (6-hooked) embryo (Oncosphere), thick dark brown to yellow in color (Fig. 2). There is an outer oval membranous coat, the true egg shell, which is lost in fecal eggs [6, 11].

**Epidemiology:** Taeniasis occurs throughout the world with variable degree of prevalence [14]. Animals and humans are an essential link in the epidemiology of taeniasis and cysticercosis. Areas of endemicity are central and southern America, central and southern Africa, Southeast Asia and southern and eastern Europe; due to defecate in open field both cattle and swine have easy access to *Taenia* species [15, 16]. In industrialized countries the infection become almost eliminated due to meat and pork inspection and measures which minimize or prevent access of cattle/pig to human feces, such as hygiene and modified condition of pig/cattle production (Housing) [17]. In developed countries, cattle of any age are susceptible to infection since they generally possess no acquired immunity [18].

High prevalence of *T. saginata/Cysticercus bovis* occurs in Africa where cattle are kept in community grazing lands. The parasites appear to be specific to cattle, while wild animals play no part as intermediate hosts. *T. saginata* is distributed worldwide, where cattle are raised and beef is eaten as raw or under cooked. It is very common in Ethiopia [12].

*T. solium* is found worldwide, because pigs are an intermediate host for the completion of life cycle occurs in regions where humans living in close contact with pigs and eat under cooked pork. However, Taeniasis and cysticercosis are very rare in Muslim countries; due to religious reason, they do not eat pork. It also occurs in most pork eating countries where sanitary conditions are preventive and scavenging pigs have access to human fecal materials [9].

Cattle of all ages are susceptible; however young age groups are more susceptible. Management of animals in their natural environment predisposes them to infection. Cattle grazing communally have a higher risk of picking up *T. saginata* eggs since they are frequently in contact with human feces compared to commercial herds, the risk of cattle coming into contact with *T. saginata* eggs is much higher when cattle are at pasture [14].

The mode of infection of bovine host is imperfectly understood; as the majority of human infection occurs in urban districts where the carriers have no opportunity of directly infecting pasture with egg laden feces [12].

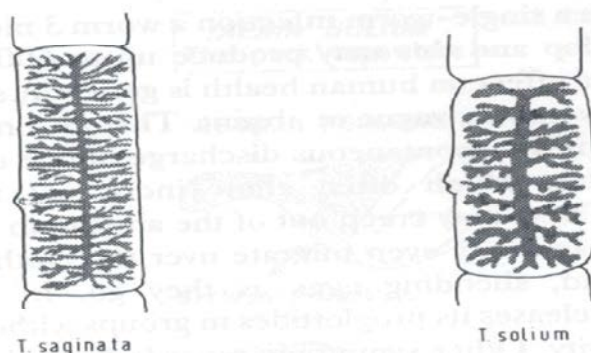


Fig. 1: Uterine branches of *T. saginata* and *T. Solium*  
Source: Smyth [9]

## Taenia species

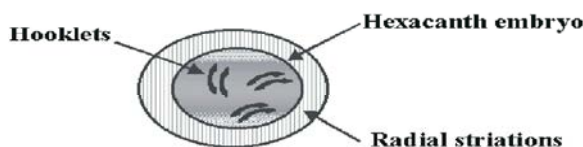


Fig. 2: Egg of *Taenia* species  
Source: Smyth [9]

Table 2: Host and sites of *Taenia* species

Adult tape worm	Final host	Larva	IH	Larval site	Adult site
<i>T. saginata</i>	man	<i>C. bovis</i>	cattle	Muscle	Small intestine
<i>T. solium</i>	man	<i>C. cellulosae</i>	Pig and man	Muscle and brain	Small intestine

Source: Urquhart *et al.* [11] and Taylor *et al.* [13]

Infection of the intermediate host is affected by many factors. These include the level of environmental contamination, age the host, egg dispersion rate, egg survival, immune response of the host and heterogeneous infection presence [19]. The major mode of transmission includes eating raw or under cooked pork/meat, eggs in feed or drink animals are infected from contaminated pasture and in case of *T. solium*, autoinfection is common; that is, carrier of adult tape worm are not only a source of infection for pig as IH, but also a risk for themselves and other persons [11]. Adult stages of tapeworms are parasitizing cattle are little consequence [3].

Man acquires cysticercosis by ingestion of *T. solium* egg with food (Vegetable, fruits) and water contaminated by feces of the *Taenia* carrier and ingestion eggs introduced to mouth by the contaminated hands of an individual with poor hygiene habit, or oncospheres from the intestine that are transferred from the anal region to the mouth (Anus- hand-mouth). Human cysticercosis is acquired by ingesting *T. solium* eggs shed in the feces of

a human tapeworm carrier via gravid proglottids, so can occur in populations that neither eat pork nor share environments with pigs, although the completion of the life cycle can occur only where humans live in close contact with pigs and eat pork [20].

**Life Cycle:** The life cycles of *T. solium* and *T. saginata* are indirect complicated than trematodes [21]. Both species are similar in life cycle, except cattle are an intermediate host for *T. saginata* and pig as an intermediate host for *T. solium* for the developments of larva. They are dependent primarily or exclusively on man as a defined host for the combination of their life cycle [22].

An infected human may pass millions of eggs daily, either free in the faeces or as intact segments each containing about 250000 eggs and these can survive on pasture for several months. After ingestion by a susceptible bovine the oncosphere travels via the blood to striated muscle. After about 12 weeks, it is then

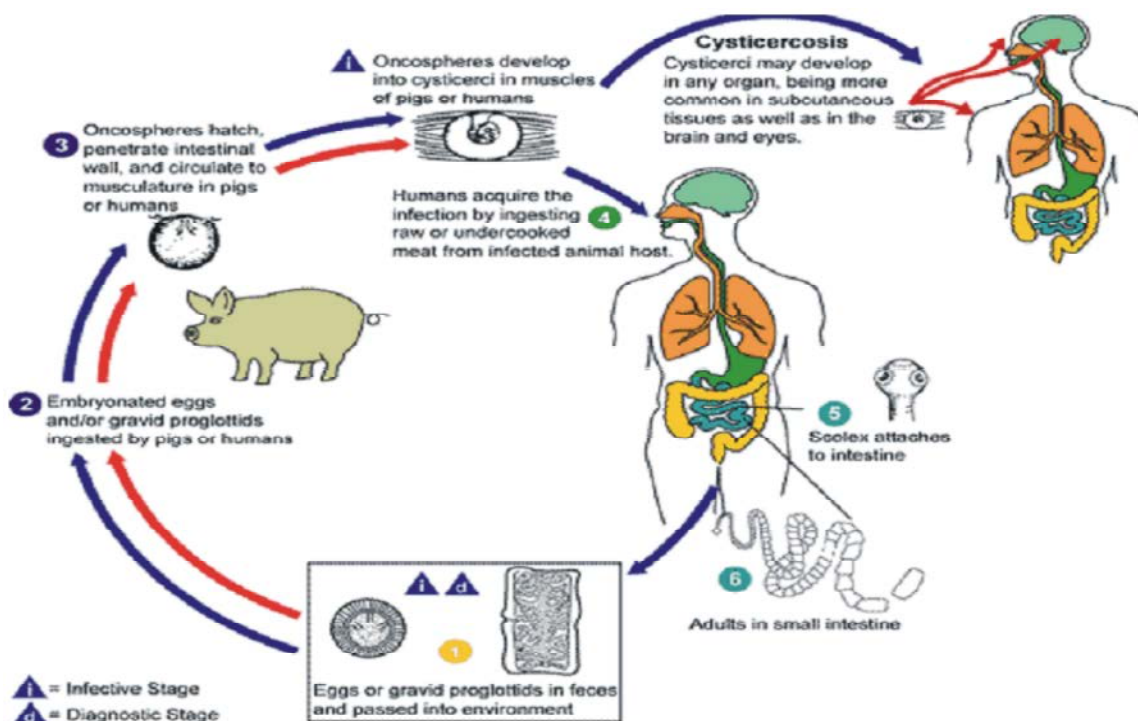


Fig. 3: Life cycle of *T. solium* Source: Centers for Disease Control and Prevention (CDC), [www.dpd.cdc.gov/dpdx/HTML/Cysticercosis.htm](http://www.dpd.cdc.gov/dpdx/HTML/Cysticercosis.htm))

enclosed by the host in a thin fibrous capsule. Man becomes infected by ingesting raw or inadequately cooked meat. Development to patency takes 2-3 months. They form in to adult tapeworm in the small intestine for year, starting the cycle all over again [16, 23].

*Taenia saginata* in the small intestine of man absorbs digested food. From the day the cysticercus is ingested it may take 2-3 months for the parasite to produce ripe segments. As long as the scolex is attached to the intestinal mucosa of the victim, new segments will continually grow to replace those, which are being detached from the worm [24].

The life cycle of *T. solium* is also similar to that of *T. saginata* with the important difference that man, the final host, may also become infected with cysticerci (Fig. 3). This may occur either from the accidental ingestion of *T. solium* eggs or, apparently, in a person with an adult tapeworm, from the liberation of oncospheres after the digestion of a gravid segment which has entered the stomach from the duodenum by reverse peristalsis; this is known as autoinfection [16, 23].

**Pathogenesis:** In the case of *T. solium*, clinical signs are in apparent in pigs naturally infected with cysticerci and generally insignificant in humans with adult tape worms

[13]. However, when humans are infected by cysticerci through the ingestion of *T. solium* egg or proglottid, rupture within the host intestine can cause larvae to migrate in the host tissue. It is the most frequent and sever disease. Cysticerci may be found in every organ of the body in humans but most common in the sub cutaneous tissue, eye and brain. In symptomatic case, wide spectrum of symptom may be expressed, including headaches, dizziness and occasionally seizures. In most severe case, dementia or hyper tension can occurs due to perturbation of the normal circulation of CSF; any increase in intra cranial pressure will result in corresponding increases in arterial blood pressure as the body seeks to maintain circulation in the brain [20]. The severity of cysticercosis is depending on location, size, number of parasite larvae in the tissue as well as the host immune system. In children ocular location of cyst is more common than cystation in other location of the body [20].

Although cysticercus bovis (Larval stages of *T. saginata*) may occurs in anywhere in striated muscle the predilection sites, at least the view point of routine meat inspection are the heart, the tongue and the masseter and the intercostals muscles. Under natural condition the presence of cysticerci in the muscle of cattle is not

associated with clinical signs although, experimentally, calves given massive infection of *T. saginata* eggs, have developed severe myocarditis and heart failure associated with developing cysticerci in the heart [25].

**Clinical Signs:** Taeniasis symptom is a result of the adult tapeworm. Infection with adult *T. saginata* may persist for years without clear symptoms; however when there is heavy infection, symptoms such as obstruction, diarrhea, hunger, pain and loss of weight has been reported. Most commonly patients describe discomfort and embarrassment by proglottids crawling from the anus [12, 26].

Adult *T. solium* is generally not associated with severe symptom, like patients infected with *T. saginata*. However, when men are acting as IHDs, infected with cysticerci, various clinical signs are occurred depending on the location and number of cyst in the organ, muscle or subcutaneous tissue and causes cysticercosis resulting impaired vision or blindness, nausea, vomiting and occlusive hydrocephalus [17]. Other symptoms such as chronic meningitis accompanied by headache and neck stiffness, vasculitis, neuritis and myocarditis should be occurred. Cysticercosis symptom is a result of inflammatory or immune response [25].

The most noticeable symptom of taeniasis is the spontaneous discharge of one or several proglottids, which often show individual muscular activity. These may creep out of the anus onto the perianal skin and even migrate over clothes of the distraught host or on the ground, shedding eggs as they go [27].

**Pathology:** Cysticerci are comprising a single large cyst and inverted scolex measuring 1-2cm and easily visible between muscle fibers. The cysticerci is rapidly unshathed in computerized tomography and create a crescent zone of degenerative lyses around them, their by allowing room to grow. Pigs are usually slaughtered at an age when all cysticerci are generally still viable [13].

**Diagnosis:** Signs and symptoms of taeniasis are rather vague and finding the egg is the best method of determining whether a person has a taeniid infection, but an identification of species can be made from the egg, because they are so similar [2]. However laboratory examination to detect egg in feces using saline microscopy, so that the morphology of *T. saginata* and *T. solium* differentiated. Grossly, *T. saginata* has four suckers, no hooks and rostellum. Microscopically, gravid segments have up to 30 uterine branches on each side vaginal sphincter present and egg are taking acid fast

staining by using Ziehl Nielsen technique. In the case of *T. solium* having four sucker and rostellum with hooks (Grossly) and microscopically gravid segments have up to 13 uterine branches on each side; vaginal sphincter absent with the egg is not taking acid fast stain [28].

Stool microscopy for diagnosis of taeniasis is inefficient and thus it is not recommended unless there is a specific indication and no suitable alternative. Even with multiple samples and concentration of large volumes of stool sample, sensitivity of stool microscopy does not exceed 60 to 70%. As the eggs of *T. solium* are morphologically identical to those of *T. saginata*, the finding of *Taenia* eggs should be reported as *Taenia* species eggs. Theoretically it is possible to distinguish proglottids of *T. saginata* from those of *T. solium* by counting the number of uterine branches. The principal method of diagnosis is perianal swab made on three alternative days. The material is examined as a wet mount under microscopy; Thick stained smear of feces may be examined, egg in feces may be concentrated by either floatation or sedimentation technique, serological test such as ELISA may be done to determine whether animal or person has antibodies in the blood to tapeworm, this is not highly specific [2].

Current diagnosis based on microscopic observation of eggs lacks both sensitivity and specificity. In the present study, a nested-PCR assay targeting the Tso31 gene was developed for the specific diagnosis of taeniasis due to *T. solium* [29].

Human neurocysticercosis is a major cause of epileptic seizures and other neurologic morbidity worldwide. The diagnosis of neurocysticercosis has been considerably improved in recent years. This improvement includes identification and sequencing of specific antigens and development of new assays for laboratory diagnosis, recognition of the frequency and significance of edema around old, calcified cysts (Associated to symptomatic episodes), results of a randomized blinded control treatment trial on treatment efficacy for intra-parenchymal disease showing a clinical benefit of decreased seizures and a much better assessment of the frequency and spectrum of cerebrovascular complications. These advances now permit a much better integration of clinical, serologic and imaging data for diagnosis and therapeutic purposes [30].

Cysticercosis is diagnosed primarily confirming the presence of hooks in the scolex of *T. solium*. Radiographic tests, such as, X-rays are used to identify calcified larva in the subcutaneous tissue and muscle and CT and MRI are also useful in evaluating neurocysticercosis.

Diagnosis of cysticerci in pig is usually made by meat inspection procedure [28]. Meat inspection relies exclusively on visual examination of the intact and cut surfaces of the carcass (Eye-and-knife method) in the slaughter house by meat inspectors who follow officially laid-down procedures [18].

Individual countries have different regulations regarding the inspection of carcasses, but invariably the masseter muscle, tongue and heart are incised and examined. Several of these are also the sites at which the largest concentration of metacestodes is found in experimentally infected animals. Diaphragm, muscles of the hind limb, liver, esophagus, lungs, kidneys, spleen and intercostals muscles are potential sites for cyst location. Classical meat inspection techniques cannot detect all of the carcasses infected with cysticerci [14].

**Treatment:** Both species of adult *Taenia* are treated similarly. Treatment of *T. solium* taeniasis should be started immediately after diagnosis; patients with this disease represent a hazard. Therapy of cysticercosis in swine is generally not indicated. *T. solium* can be treated with niclosamide or praziquantel (Opens membrane calcium channels, causing paralysis of the worm, thus aiding the body in expelling the parasite through peristalsis), the latter is also effective against cerebral cyst of *T. solium* in man. Fenbendazole (5mg/kg, po) administered for 7 days and, mebendazole (25mg/kg, po) for 5 days were described to be effective against cysticercosis in swine, followed by purgative, for example magnesium sulphate (MgSO<sub>4</sub>) to expel the dead worms [6, 31].

Convulsive neurocysticercosis patient is respond usually to anticonvulsive, specifically Albendazole (15 mg/day, given in two doses orally, for up to 30 days) and Praziquantel (20mg/kg three times per day orally for two weeks) [17].

In cysticercosis for humans by surgical removal of the CNS lesions; however prognosis is not good [32]. Traditionally, peoples with tapeworm in Ethiopia self-treating with extract of kosso, the Amharic name for a slender flowering tree (Species name *Vaginaabissinica*) or Enkoko, the scarlet fruit of the climbing shrub (Species *Embeliashimperi*), both which have been proven taenacidal properties [33].

**Control and Prevention:** Control measures; consist of interrupting the epidemiologic chain at the level of the definitive host (Man) and of the intermediate hosts (Cattle and swine). Control and prevention is achieved by protection cattle/pig from grazing on feces or sewage

polluted grass, not using un treated human feces as fertilizer for pasture land which may contain segments and ova, avoiding eating raw or insufficiently cooked meat/pork which may contain infective larva, inspecting pork or meat for larva, treating infected person and provide health education [34].

In developed countries the control of bovine cysticercosis depends on a high standard of human sanitation, on the general practice of cooking meat thoroughly (The thermal death point of cysticerci is 57°C) and on compulsory meat inspection. In developing countries the same measures are necessary, but are not always economically feasible and at present the most useful step would appear to be the education of communities in both sanitary hygiene and the thorough cooking of meat [11].

Deep freezing of meat will kill all cysticerci in 24hrs, but a whole carcass has to be frozen for about 21 days before all parts reach the correct temperature as a meat is a good insulator. Cysticercosis in animals is a serious for the owners as a meat may be condemned. So that to control this; establish active surveillance for taeniasis, tapeworm carriers should be detected and treated, avoid of food and water that might be contaminated with soil or fecal matter and strict hygiene measures and hand washing (When visiting endemic areas) [35].

The infectiousness of cysts in beef is affected by temperature and other kinds of treatments. The cyst dies at the foreign temperatures: Frozen meat: 15 days at -5°C, 9 days at -10°C, 6 days at -15°C; Cooked meat: 50-60°C and Radiation: 100 Kilo rad [36].

Chemotherapy in humans reduces the spread of eggs and infection in cattle [6]. Studies carried out in the last two decades have demonstrated that bovine acquire strong immunity against re infection by *T. saginata* and that resistance can be conferred on them by inoculation with viable onchosphere (Parental route), onchosphere attenuated by radiation (Oral route) the excretion of onchospheres in culture medium. Likewise, vaccination with a heterogeneous species such as *T. hydatigenia* or other *Taenia* has been shown to increase resistance against *T. saginata* and also provide passive protection to new born through the colostrum by immunizing the mothers [20, 37].

**Zoonotic Importance:** Human taeniasis is caused by infection with the adult stage of the tapeworms, *T. saginata* and *T. solium*, while human cysticercosis results from infection with the larvae (Cysticerci) of the latter species. Both of these parasites occur in Africa as zoonoses because the usual hosts for the cysticerci are

cattle and swine respectively, from which humans become infected with the adult tapeworm [38]. About 100 million people worldwide may be infected with either *T. saginata* or *T. solium* [7].

*Taenia saginata*, Taeniasis occurs throughout the world with variable degree of prevalence [14]. In the world there are 77 million bovine Taeniasis patients of which 32 million are in Africa, 11 million in Asia (Excluding the former USSR) and about 3 million in the new world. Its prevalence could be classified into three groups [19].

*Taenia solium* cysticercosis is prevalent in humans and pigs in many developing countries of Latin America, Asia and Africa, where its life cycle is sustained because of the coexistence of poor sanitary conditions, free range management of pigs and absence or inadequate meat inspection [38].

Taeniasis considered infectious but is not transmitted from person to person. The most common causative agent in Ethiopia is beef tape worm (*T. saginata*), which has the cow as its intermediate host, due to wide spread habit of eating raw (Kitfo in Amharic), low awareness, poor hygiene and sanitary practice, existence of higher population density and under extensive husbandry practice in the rural communities may facilitate the transmission of the disease between animals and humans [39].

In a single worm infection, a worm can develop longer and produce large number of proglottids [9]. Multiple infections up to 20 tapeworms in one host are often occurring in developing countries. The effect on human health is generally slight and symptoms may be vague or absent. *Taenia* has a debilitating effect on people who already have live of protein deficient diets suffer from iron deficiency and infected by hookworm [40].

The prevalence of *Cysticercus bovis* at Jos abattoir (Nigeria) during post mortem examination conducted on 14, 372 slaughtered cattle over a period of two years (January 1997 – Dec. 1999), using evagination method, was 13.4 % (1924). The sites of the location of the larvae varied from one organ to another with the heart having the highest 48 (30.0 %) and the least affected were the visceral organs livers, lungs and esophagi. There is a positive correlation between the number of *C. bovis* cyst and the percentage frequency of the organ affected [41].

A cross-sectional study conducted on bovine cysticercosis in cattle slaughtered at Awassa municipal abattoir showed a prevalence of 26.25% infection of *T. saginata* cysticercosis while that of *T. saginata* taeniasis was 64.2% (77 of 120). The potential risk factors identified for disease contraction were raw meat consumption, religion and occupational risks [42].

**Economic Importance:** The pathogenic significance of cyst is considered to be very low except its economic significant as a result of carcass or organ contamination. However, human taeniasis has economic and health importance. Sick individuals may have poor appetite, abdominal pain, weight loss that may lead to reduce their working performance, occasional finding of detached proglottid in their feces, under wear or on the body were bring about lawful aesthetic impression or repulsive feeling [43].

Attempts to reduce the prevalence of *T. solium* and *T. saginata* in humans and their cysticerci in animals (Pigs, cattle) may have a considerable impact on the economics of meat production industries. Cysticercosis in domestic animals is a significant food safety problem and causes economic loss in food production. This will be particularly important where export industries are involved, since most importing countries have stringent regulation designed to prevent the importation of infected meat [14].

The cost implication can be broken down into those involved in treating human taeniasis and cattle carcasses (Costs of freezing, boiling) or condemned, as well as the costs involved in the inspection procedures amount to millions of dollars [40]. This mainly arose from the loss of value in abattoirs resulting from boiling the meat to kill the cyst, as the presence of cysticerci in the meat would be a serious obstacle to meet the import regulations of the recipient countries [10].

Most of big disease problems seen with *Taenia* tapeworm infestation actually occur in the intermediate host animals. Numerous expanding cysts in important bodily organs can be devastating for the intermediate host animals, often resulting in significant symptom of disease and disability, as such infested meat is often down grading or outright rejected for sale; in the case of pork, meat infested with *T. solium* cyst outright dangerous for the consumers, should proceed raw pork inter the human food chain [25].

The financial loss to commercial meat producers can be significant. Meat and offal infested with *Taenia* cyst of any species (Even those species not infective to man) will most likely to be rejected from the commercial food chain (Will not be able to be sold) because of people will not buy it (People are unlikely to eat meat or organs with cyst in them). Should *T. saginata* cyst be found in beef or meat, the meat rejection is likely to be doubly enforced since the organism is significance to human health. *Taenia solium* is known to be highly dangerous to man and it is considered exotic and notifiable in many countries. A dead animal produces no meat, wool or milk

and is a financial loss. Should that diseased animals be of genetic value (Example good stud bull, high yield dairy cow), then the commercial loss is compounded through the loss of those productive gene to be future generation of animals. Extra cost will be incurred in replacing the valuable animals [14, 25].

### CONCLUSION

The wide distribution of *Taenia* species are associated with several factors including: raw and under cooked beef consumption, bush defecation and poor waste disposal, poor sludge and sewage treatment system, low level of public awareness and presence of backyard (Village) slaughtering practices. Conventional meat inspection technique is less sensitive and time consuming, lightly infected carcasses can be easily missed and passed for human consumption thus the infection transmission is maintained between humans and cattle. Thus taeniasis /cysticercosis, remains a widespread zoonoses that affects human health and economy through condemnation, quality degradation of frozen beef, cost of refrigeration, cost of human therapy, lowering productivity of infected workers who may be absent from work or reduce their working efficiency by creating uneasiness. There should be strong and close collaborations between medical and veterinary professionals to reduce the impact of the disease in both human and animals.

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