

# Cats and Animals Product as a Source of Transmission Toxoplasmosis

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## Mini Review

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## Abstract

Toxoplasmosis is a zoonotic disease caused by an intracellular protozoal infection, *Toxoplasma gondii*. Cats and Felidae are definitive host and non felidae mammals and birds as intermediate host. Worldwide, domestic cats are estimated to be infected with ranging from 30 to 40%. Cats produce and shed oocysts and contaminate the environment for long time. Sporulated oocyst is infectious stage for livestock and product (meat, milk and eggs) of infected livestock can act as a source of *T. gondii* infection.

**Keywords:** Animal Product; Cat; Environment; Livestock; *Toxoplasma Gondii*

## Introduction

Toxoplasmosis is a disease caused by an intracellular protozoal infection, *Toxoplasma gondii*. The disease is zoonotic, humans and all warm-blooded animals, birds and mammals, can become infected. Cats and other members of the Felidae as definitive host and the other animals include human as intermediate host. Felidae shed oocysts that can widespread and contaminate the environment [1].

Life cycle *T. gondii* was described by Dubey et al., Hill and Dubey and Syblay et al. [2-4]. *T. gondii* belongs to phylum Apicomplexa. There are three infectious stages: tachyzoites, bradyzoites and sporulated oocyst. Individual was infected by ingest that stages. Tachyzoites is a rapidly dividing invasive stage that found in the condition of acute infection. Bradyzoitosis a slowly dividing stage which maintain chronic infection and its clustered to form a cyst in a host cell and called tissue cyst. Oocyst is the

result of sexual development in the cat's intestine and is shed along with cat feces, and it so called an environmental stage. Oocysts undergo sporogony in the environment to yield sporozoites.

Individual can infected *T. gondii* by three infectious stages. Transmission to human is mainly through food by ingestion of sporulated oocysts or tissue cysts or tachyzoites contained in meat or the other animals products. The consumption of undercooked, raw or cured meat is a major mode of transmission of Toxoplasmosis to humans [5]. Although, mostly, infection in immunocompetent individuals, is asymptomatic or it does not cause serious illness, but in congenitally infection it cause any problem [6]. The clinical manifestations of congenital toxoplasmosis are ranging from mild to severe such as visual impairment, retinochoroiditis, blindness, hydrocephalus or microcephaly, intracranial calcification, seizures, mental retardation, abortion and stillbirth [7,8].

### Cats as a Source of Transmission

As the definitive hosts of *T. gondii*, Felidae have an important role in epidemiology of the disease because the sexual reproduction only take place in intestine of felines [2]. Most feline were infected through ingestion of infected tissue cysts in infected pray but rarely by sporulated oocysts [9,10]. Cats shed oocysts from days 4-11 post-infection [4]. Among members of Felidae, domestic cats are probably the major source of contamination since oocyst formation is greatest in domestic cats may excrete millions of oocysts after ingesting only one bradyzoite or one tissue cyst, and many tissue cysts may be present in one infected mouse [11]. Oocysts take 1-5 days to sporulate in the environment. Sporulated oocysts survive for long periods under most ordinary environmental conditions. In moist soil, its can survive for months and even years. Oocysts also resistant to disinfectants and freezing, respectively, in native cat feces and uncovered for 46 days and in covered soil for 334 days and for 18 months in soil buried at the depth of 3-9 cm and in -21°C for 28 days [12].

Many researchers have reported epidemiology of *T. gondii* infection in domestic cats both stray and household cats. The seroprevalance of toxoplasmosis in domestic cats is estimated worldwide with ranging from 30 to 40% [9]. In Bangkok, *T. gondii* was detected in 72 (4.8%) of 1,490 stray cats in 56% (28/50) of areas [13]. The prevalence rate of cat toxoplasmosis in various regions of Iran ranged from 1.2% to 89.2% [14]. According to Castillo-Morales et al, domestic cats from the Tropic Mexico were detected toxoplasma infection in acute and chronic and the prevalence was very high, more than 70% [15]. From Bali Indonesia, Subrata et al found 17.5% cat's feses in Bali positive with oocyst *T. gondii* [16]. The Seroprevalance feline toxoplasmosis in the other county, respectively, was 48.4% in Finland, 60.8% in Estonia and 12.08% in public shelter in Rio de Jenairo Brasil [17-19].

### Animals Product as a Source of *T. gondii* Infection

In the life cycle of *T. gondii*, non-felidae mammals and all birds act as intermediate hosts [2]. Livestock are primarily infected with *T. gondii* by oocysts. Developing *T. gondii* in intermediate host was described by Dubey [20]. After ingestion sporulated oocyst, sporozoites release from oocysts and penetrate intestinal tissues, transform to tachyzoites, multiply locally, and are disseminated in the body via blood or lymph. After a few multiplication cycles, tachyzoites give rise to bradyzoites in a variety of

tissues as tissue cysts. The tissue cyst is located primarily in the central nervous system (CNS), eye and skeletal muscle and heart [21]. The Infected livestock can store *T. gondii* tissue cysts during its lifetime, indicating potentially significant risks to public health if their meat is consumed raw or undercooked [22]. Oral transmission through ingestion of tissue cysts can lead to the spread of *T. gondii* infection through the food chain in carnivorous or omnivorous (include human) [4].

Tissue cysts of *T. gondii* are most frequently observed in tissues (meat product) of infected pigs, sheep, and goats. Several epidemiological studies that showed some livestock were infected *T. gondii*, for examples, Seroprevalence of *T. gondii* infection livestock in Slovakia was 25%, ranges from 0.1% to 92% in Italy, 17.68% of goat and sheep in Central Ethiopia, in cattle in Brazil ranges from 1.03 to 71% Albuquerque et al and Hamilton et al detected DNA of *T. gondii* in heart tissue and found that 21% of pigs, 16% of sheep and 23% of goats tested in west Indies were positive of the Type III genotype of *T. gondii* [22-26].

Role chicken in the epidemiology of *T. gondii* infection was reviewed by Dubey [1]. And the prevalence of the parasite *T. gondii* was found very high in raised commercial free-range chickens, (30-50%), moreover, in backyards system (up to 100%) [1]. Dubey, Millar et al found that Free-ranged chickens raised for egg production proved to be the most exposed group to the *T. gondii* infection [27]. Mufasirin and Suwanti detected 16.7% of egg of free range chicken in Surabaya Indonesia infected with viable *T. gondii* [28].

Survival of tissue cysts of *Toxoplasma gondii* in food were reviewed by Tenter AM [21]. Bradyzoites of *T. gondii* in tissue cyst are resistant to digestive enzymes, therefore, host will infected if ingestion of viable tissue cysts. Tissue cyst also resistant to changes in temperature, it remain infectious in refrigerated (1-4°C) car casses or minced meat for up to 3 weeks, at 60°C for about 4 min and at 50°C for about 10 min and tissue cysts are killed at temperatures of -12°C or lower and by heating up to 67°C.

Evidence that Tachyzoites *Toxoplasma gondii* has been found in milk and its ability in transmiion infection has been documented by several researchers. Powell et al, Costa and Langoni, respectively reported, that cats and rat infected with *T. gondii*, their milk contained viable and transmittable *T. gondii* [29,30]. Conducted research and reported that *T. gondii* lives can be excreted in goat's milk and can survive in fresh cheese, while Bezerra et al and Ossani, et al. found, respectively, 6.05% and 30.95% of the

milk samples of naturally infected goats and dairy ewes were positive with *T. gondii* [20,31-34].

### Conclusions and Recommendations

Cats and livestock, both, play a role in the transmission of toxoplasmosis. Oocyst that excreted in cat feces act as a source of transmission both in humans and livestock. Infected Livestock in meat, milk or eggs contain tissue cysts that are as a source of transmission for carnivorous and humans.

Therefore, it is recommended to keep the environment free from oocysts,, Pet Animals (Cats) must be healthy and kept indoor, Farm and the sheds must be free from oocyst, cats and pray animals, Animals product must be prossed to inactivate viable Toxoplasma.

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