

## THE EVALUATION OF *Toxoplasma gondii* INFECTION IN CATS AT TIRANACITY

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### ABSTRACT

*Toxoplasma gondii* is a widespread zoonotic protozoar that infects humans and animals. As the definitive hosts for this parasite, felines are the only animals that pass oocysts in their feces. *Toxoplasma gondii*, is one of the most common parasitic infections of man and other warm-blooded animals. It has been found world-wide and nearly one-third of humanity has been exposed to this parasite. In most adults it does not cause serious illness, but it can cause blindness and mental retardation in congenitally infected children and devastating disease in immunocompromised individuals. Tirana is a city still in expansion and changes that have occurred in recent decades have brought many variations that affect the distribution and epidemiology of parasites (pathogens). The number of domestic cat (*Felis catus*) is quite present in Tirana (nearly 6000) and a great number of them live in free increasing the possibility of contamination. Toxoplasmosis resulted positive in 1.8% of cats examined, in a study involving 442 owned cats. Parasitic loads were variable, but with higher values and a danger for the infestation potential capacities of the environment, food and water. The large number of oocysts per gram of faeces in positive samples clearly pointed out the risk that infestation to the health of human and animal. Occasional screening and monitoring of the feline population and their treatment is the main way of knowing the epidemiological situation and the risk minimization by toxoplazmoza. While monitoring of contact with cats and preserving environmental quality, food and water is the main way to avoid infestation of intermediate host (including man) from it.

### INTRODUCTION

The life cycle of *Toxoplasma gondii* is complex where feline (cat) are the definitive host and produce oocysts arising in the environment with faeces and contaminate water and food (Hill & Dubey, 2002). The domestic cat (*Felis catus*) infected flesh infested by parasites in the intestines and intrainestinal cycle develops. Oocysts are very resistant and can survive in the environment for more than a year. These oocysts are sporulated into the outer environment and then distributed through rain and surface water, contaminating food of animals and humans (Dubey, 2001, 2009, 2016). The domestic cat and other cats are more frequently infested by eating rodents that have cysts in their musculature and brain. But they can be infested with mature oocysts that is contaminated with soil, water, vegetation, and in one way or another of them swallowed. Outbreaks of acute toxoplasmosis worldwide in coming intermediate host being added and has an interest in knowing the epidemiology (Rembiesa C., et. al. 2003). Research on the prevalence of *Toxoplasma* oocysts in water and food are still rare and difficult (H. Fritz, et. al. 2012). Recently, alternative methods have been proposed which include numerous methods

where the main element is spin and simple navigation (Camilla W., et. al. 2016). Oocysts can be detected by coproscopic examination with the method of assessment with high-density solutions (Schaes, G., et. al. 2005). Final host for *T.gondii* family are only carnivores belonging to the Felidae family, while intermediate hosts are numerous. As intermediate host are almost all mammals and birds, ranging from rodents, insectvores, carnivores, marsupial, primates (including humans) and many species of birds such as chickens, pigeons, canaries (Dabritz H.A., et. al. 2007). They are experimentally infested turtles, chameleons and lizards. It causes miscarriages, neonatal death and substantial economic loss. In most invasions of toxoplasmosis in animals as well as people spend without clinical signs. But there are few cases where the parasite reveals a high degree of pathogenicity causing the death of host.

## MATERIAL AND METHOD

Using routine techniques of dying with color is vital for finding and differentiation of Mc Master for oocysts and oocysts count in one gram of faeces. There are qualitative methods of modifying known as Kato-Katz test (Katz et al., 1972, Clark, J.D., 1996). This method was modified with vital dye and unless differentiation of oocysts was used for the evaluation and quantification of oocysts. To determine the level of infestation of cats was asked to assess the oocysts in cat faeces (Katz N., et. al. 1972). From cats suspected of the disease was collected 5 grams of faeces. Stools were examined in veterinary hospitals in Tirana and in the parasitology laboratory at the Faculty of Veterinary Medicine with a combinations of the two coproscopic methods. Laboratory work consisted in using of the modified model Kato Katz Kinyoun using model (KKK) with Gimsae and blue methilen as working solutions. To count of oocysts in faeces Mc Master technique was used with saline solution (Clark, J.D., 1996). The salt was ZnCl<sub>2</sub> solution saturated in NaCl. Coproscopic technique is performed in 5 g faeces mixed with 45 ml saline solution (density 1.4). For simple quantitative examinations of the faeces in the beaker after centrifugation the supernatant set for examination was moved by sliding. Oocysts microscopically were evaluated by navigation, cellular structures 10 µm thick walls and finding matured sporozoids. Faeces are processed with dye Kinyoun (KKK), Gimsae and the blue methilento do while counting the oocysts are applied dilutions of the order 100-1000 x due to the large number of oocysts per gram/faeces. Faecal samples were placed inside a gauze that functioned as filter. The filtered liquid was taken for the preparation of samples and filling Mc Master slides. Smears were hold in the hot air and painted (Luciana R. M., et. al. 2008). Oocysts of *T.gondii* has a structure appeared as red or blue with a diameter of 10 µm. The number of oocysts was determined by using a quantitative method of counting oocysts and calculated in each 40x optical field and level of dilution. For each sample were observed 2 microscopic smears which in the case of quantitative accounting of the 0.04 g faeces.

## RESULTS AND DISCUSSIONS

When a cat is infested (not only through the meat) the parasite in the intestine produces oocysts during what is known as the cycle of intrainstestinal infection. These oocysts come in large numbers in the stools of the cat. Cats begin to produce oocysts 10 days after receiving infested tissue, a process that continues for 10-14 days. Oocysts were spread by contaminated water into the environment and food. These oocysts sporulate into the outer environment and distributed through rain and surface water, causing pollution. Infested intermediate host when oocysts of sporular take food or water. Intermediate host according to their type and depending on the mode of feeding, can be infested with various stages of the route with the oocysts mature sporozoites with tachyzoites the pseudocyst or

bradizoites of cysts. These forms of the parasite, reach at the host digestive swallowing broker, cross the intestinal walls with SRE mediator cells where within which become tachyzoits and spread throughout the body. This is a diffusion stage of plurivisceral traceosites that multiply rapidly through endodiogeny. They reach at those outlets with hematogenous or lymphatic routes. Replication continues to rupture the host cell. The process usually continues until the development of specific immunity, or more rarely to death of the host. Toxoplasmosis is a protozoal disease affecting millions of people worldwide. In general, this disease develops without clinical signs in immunosupressed individuals, but can causes abortions, complications of multiple births, mental retardation, severe ocular and acoustical problems in children infected in the congenital way and clinical manifestations with fatal outcome on individuals as well as defects of the immune system. It causes miscarriages, neonatal death in animals (ruminants) and considerable economic losses for farmers. Tirana is the capital of Albania, with about 800,000 inhabitants. Number of cats in this environment is estimated around 6000. Most of them are under human care. Even those who live in free (a number around 1500), however, are somehow in contact with humans for their food. Results of the study belong to a period of 10 years from 2006 to 2016. Sampling of cats was conducted individually. Most cases were brought samples of animal owners. This was done in this way because the time required for sporulation occurs the oocysts (2-4 days) when they have achieved or be sporular phase during sporulation occurs. This means that the stools should not be totally fresh, because the process of sporulation occurs in the environment.

Samples were collected by the owner or the use of approximately for direct sampling of cats relates to the characteristics of these animals as aggressiveness, etc. with small measure. In addition, in cases of sampling in the rectum (veterinary hospitals and clinics) samples generally were attempted to be kept under conditions that enable sporulation occur. *T. gondii* oocysts of 10-12 micron size were recovered and are calculated after dyeing easy, because oocysts were stained with distinct and clearly identified. They appear as color allowing their identification by several other representatives of the family Toxoplasmatidae and quantified.

**Table 1**

**Results of coproscopic examinations at cats.**

Subject	Sample no.	Positive		Parasitic loud
		No	%	oocy/gr
FVM	92	2	2.17	480 000
Petlife Hospital	116	2	1.72	800 000
Other Vet Hospitals	78	1	1.28	2 200 000
Veterinary clinics	156	3	1.92	1 600 000
<b>Total</b>	<b>442</b>	<b>8</b>	<b>1.8</b>	<b>1 200 000</b>

The examination carried out in the laboratory of veterinary parasitology, FMV during practical work together with students (2006-2016) of 92 samples only 2 cats (17.2%) tested positive for *Toxoplasma gondii*. Parasitic loads averaged 480,000 oocysts / g faeces.

From 116 samples examined in Petlife Hospital (2010-2014), only 2 fecal samples tested positive, or 1.7%. Parasitic loads averaged 800,000 oocysts /g/ faeces.

Examinations performed by cats grouped in veterinary hospitals (2010-2016) only 1 of 78 samples (1,28%) tested positive for *Toxoplasma gondii*. The average load resulted in positive cat 2.2 million oocysts / g faeces.

Examinations performed by cats grouped in veterinary clinics (2006-2016) 3 samples of 156 samples (1.92%) tested positive for *Toxoplasma gondii*. The average load resulted in positive cat 1.6 million oocysts / g faeces.

In a total of 442 fecal samples examined, only 8 or 1.8% tested positive. Parasitic loads averaged 1.2 million oocysts/gr/ faeces.

Almost 100% of the examined cats are owned cats and it clearly identifies potential risk that cat owners are to getting toxoplasmosis. This is why the famous proverb cat or child who circulates and is well known by people who raise animals, especially cats. The first mother in pregnancy although it may be animal or human (female) in the acute form of the disease suffers from severe phenomena which are attributed toxoplasmatic cyst formation in her tissues, especially nervous tissue (Barutzki D., et. al. 2002). Most descendants die in life stem, some of them die in the first month of life, while the tiny portion that survives suffers serious consequences unrecoverable for life, they have a depressed immune system and are destined to be affected rather rare and die and infestations of light and banal. Positivity represents approximate value with field researchers who report about 1% of the value of prevalence in the cat during coproscopic examinations (H. A. Dabritz at. al. 2010). Prevalence may result small but in terms of the biology of the parasite offset by higher load values and the elimination of parasite oocysts in faeces. In one of the positive cats number of oocysts per 1 gram faeces resulted in approximately 3.8 million oocysts/g faeces. *Toxoplasma* resulted in the prevalence of relatively low value, but parasitic loads of positive cases resulted in very high. Large numbers of oocysts in the faeces in positive cats clearly show the great risk of infestation having a sick animal. This increases the risk of both innovation. First, the fact that a portion of the cats may result negative because it may have passed or may be in a transitional stage, not the elimination of oocysts. And secondly, the fact that the level of infestation probably expected to be slightly higher in free-living cats and are no lack of veterinary services. Significant differences were noted between parasitic loud, but these differences are explainable by known biology and characteristics of the parasite and parasitism in feline (Ahmad D.I., et. al. 2014). The disadvantage of the work had to do with manipulating the samples as painting or spin increasing the risk of contamination. The study pointed out that the definition of oocysts in the final host can serve as a tool in routine laboratory diagnosis. In addition determination of the number of oocysts shows the high risk of portraying cats for animal owners, veterinarians and for the entire range of intermediate hosts. There was observed that the prevalence of parasitic load or affected by sex. Almost the same infestation values were noted between the two genders in different cats. Positive cats were free to have an almost linear stretch across years of age 0-7 years old. Above this age there is no cat that was diagnosed positive during stool examinations. Despite the prevalence of infestation can result small (1.8% in our study) will suffice and only a street (dirty) cat in a high level environment (Chao Yan et. al 2016). This increase more potential capacities for free cats that move in large environments required for food causing the infested premises. This is the most important element is the treatment of faecal materials. They were only collected and not processed or burned. By throwing waste in the premises of rain or winds through transportation they become a source of the infection. This refers to the large number of oocysts that cats dissipating into the environment (thousands of oocysts) and the degree of the environment fecalisation. Contamination of the environment by oocysts is widespread as oocysts are shed by domestic cats and other members of the Felidae. Domestic cats are probably the major source of contamination since oocyst formation is greatest in domestic cats. 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. Generally (literature), only about 1% of cats in a population are found to be shedding oocysts at any given time. Oocysts are shed for only a short period (1–2 weeks) in the life of the catm however, the enormous numbers shed assure widespread

contamination of the environment. Sporulated oocysts survive for long periods under most ordinary environmental conditions. Congenital infection can occur in cats, and congenitally infected kittens can excrete oocysts, providing another source of oocysts for contamination. Infection rates in cats reflect the rate of infection in local avian and rodent populations because cats are thought to become infected by eating these animals. The more oocysts there are in the environment, the more likely it is that prey animals will become infected, and this results in increased infection rates in cats. Oocysts can be detected by examination of cat feces, though for epidemiological surveys, detection of *T. gondii* oocysts in cat feces is not practical. Concentration methods (e.g. flotation in high-density sucrose solution) are often used because the number of *T. gondii* oocysts in cat feces may be too few to be detected by direct smear. For definitive identification, *T. gondii* oocysts should be sporulated and then bioassayed in mice to distinguish them from other related coccidians.

## CONCLUSIONS

The *Toxoplasma gondii* oocysts were found in the stools of the cats using dye to differentiate oocysts and Mc Master with salt solution to evaluate the parasitic load in positive samples.

Only 1.8% of controlled cats resulted copropositive for oocysts. The percentage is similar to what is reported for cats by the authors in the field. The tendency of increasing the contamination in our conditions is related to the expansion of cat populations and people during the past two decades and the lack of regular veterinary service.

Assessment techniques and dying technique enabled the implementation of qualitative and quantitative diagnosis. The dying techniques can not only discover the faeces of cats and *T. gondii* oocysts but can be converted easily and successfully into a quantitative method.

Taking into account the features of the biological cycle, higher rate of environmental contamination and the risk to public health, occasional screenings should be conducted in the cat populations. Except that this should be monitored unowned cats because they move during the time required to tarnish food premises food and waters.

Cat house is one of the main sources of infestation to people who are in contact with. For this reason it is necessary attentive care and treatment of cat faeces. For this, it is necessary routine application control schemes, deworming and treatment of positive cases.

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