Zoonotic Parasitic infections of cats in human community: A histopathological Study

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Received; 2015/06/15 revised; 2015/06/28 accepted; 2015/08/22

Abstract

Introduction: Parasitic diseases could be one of the common problems of human society in any time in every place. The animals can passed this infection to human as zoonotic disease. Cats are one of the most important animals that living and eating long with human in society. Therefore feline parasitic zoonosis is threatened human health and cause death and serious disease. For the reason, the present study evaluated the current status of major canine parasitic zoonosis in this region.
Materials and methods: Fifty stray cat, road accidentally, were collected from different location of Ilam city. Within the period of one year, their internal spacemen were checked for agent parasitic and their tissues proceeds for histopathological study.
Results: Out of 50 stray domestic cats, 14 (28%) male and 36 (72%) were female. Ten species of internal-parasite like helminthes in majority and protozoan in minority were detected in the examined cats. Overall 48 cats (96 %) were infected with at least one of the parasites. The major parasites were as follow: Nematode (Toxocara cati 32.4%, Toxocara leonina 6.2% and Physaloptera praeputialis 4.5%), Cestoda (Dipylidium caninum 27.10%, Mesocestoides lineatus 14.2%, Taenia taeniaformis 6.2%, Joyeuxiella echinorhyncoides 8.3% and Taenia hydatigena 1.1%), and Protozoa (Isospora felis 21.2%, Haemobartonella felis 2.34%). There was no significant difference in infection rate between male and female cats.
Conclusion: Our result indicates that for controlling and preventing of zoonosis disease, more attention should be given to these feline infections.

Keywords: Parasites, Carnivores, Tissue, Histology, Ilam

Introduction

The infections that can be passed from animals to humans are named zoonosis or zoonotic diseases. There are so many verities of parasites that can be in this category. For some parasitic zoonosis, man can have the similar sign's as carnivores. In general, the parasite is aberrant in the others, so the signs can be seen in different ways, and the reasons is that the parasite affects different organs of or the human body reacts so differently. Tapeworms, hookworms, and protozoa are all zoonosis. In Iran and European countries; the stray and home cat has been recognized as a reservoir for Leishmania (1, 2). Some species of parasites like Isospora and Otodectes causes vomiting and also diarrhea in both man and animals (3). Many potentially zoonotic organisms of parasitic infestation and infection origin are associated with carnivores. Moreover, several cat and dogs internal gastrointestinal parasites specious are produce zoonotic infection and are considered very important to human public health, especially Toxocara spp, Ancylostoma spp and Uncinaria spp, whipworms , Dipylidium spp , Giardia and

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Cryptosporidium, are a common parasites of man and animals (4,5,6).

These Gastrointestinal parasites can produce in different time several occasional infections for humans and can even develop in to a permanent disease (6). parasites like Toxoplasma gondii and Toxocara cati are among the most important feline gastrointestinal parasites can easily transfer from cat to human (7).During development time of several endo parasites species, such as cestodes like Echinococcus spp or Dipylidium caninum and Toxocara canis humans are involved as paramedic hosts with all its disadvantages. Parasites like A. caninum and T. canis larvae can migrate and cause severe damages in the brain, spinal cord, eye and also when some parasites like Echinococcus cyst growing may be a reason for severe lung, liver, brain, or bone damage, or sometimes cause the death of its host like a human. Some parasites species such as D. caninum, which localizes in the small intestine, is a common parasite of man and carnivores and it can be develops in the intestine after accidental consumption of the intermediate host. So many species of helminthic eggs are remaining infective for a long time and period because they are resistant to different environmental factor like T. canis parasites (8.)

Endoparasites produce infection in several different ways for human and animal these diseases in the cat can show its self-such as anorexia, vomiting, diarrhea, dermatitis, anemia, loss of weights and condition (8, 6). All these parasites have oral-fecal transmission development and a major component for the spread of these parasites is the shedding of cysts or oocytes into the society and all of this will effects on community's health (9). The transmission of zoonotic pathogens may be happen through indirect or in contact with animal secretions and excretion, contaminated the water and food (10). Cat, dogs and all other carnivorous like man are associated with more zoonotic infections among which parasite in particular, helminthosis, can pose serious public health concerns worldwide (11, 12).

Moreover, some canine intestinal or gastro intestinal parasites are zoonotic. For example, hookworm larvae may penetrate to the skin of human inducing cutaneous larva migrants; in addition, Ancylostoma caninum causing eosinophilic enteritis in the digestive system of people by developing the adult worm in the small intestine of the man (8 , 6 , 13) .

Ziaie and his coworker (14) reported 29 species of helminthes in the wild carnivores from different part of Iran, including of foxes and Jackals which are the two most abundant species of animals with the susceptibility to adopt a variety of parasites for producing infection in man. Wildlife animal are reservoirs of zoonotic infectious agents, cat among this animal are represent a major public health problem affecting all continents, therefore the importance and recognition of cat parasitic infections as a reservoir is increasing in our society (15, 16, 17).The Toxocara canis and Mesocestoides lineatus are the two dominants parasites of gastrointestinal tract of jackal and red fox from Iran with prevalence of 66.7% and 33.3% (15). Researchers in this field like Borji and his colleague (3) from Iran also reported nematodes parasitic infections in stray home cat as a 28.8% respectively.

It is very importance and useful tool to medical physicians' and vet practitioner to have more information and knowledge about infections produce by carnivores especial cats population in human society for better and more correct clinical diagnoses.

Do helminthes of stray and domestic cats are also frequently implicated in public community health problems. There are several epidemiological research report from different area and regions of the world and Numerous studies on the prevalence of the internal parasites of stray dogs and wild carnivores from Iran (20, 21, 22, 23, 24, 25) but there are very few

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number of histopathological study in this field could be found to help for better understanding of this phenomena, so this research will be very useful to us in the field of sciences.

In Persian culture cats are often reared at homes as a predator of the rat or some few people as a pet, but so many of them could become stray cats as the result of changes in housing patterns. These cats live and eats freely from extra rubbish foods from LDA dust in urban and rural areas, and tend to discharge helminthic eggs, larvae and protozoan cysts in there feces into the general environment (23,24,25) and this is another way of spraying the infection in the society were the children's are playing .The involvement of internal parasites of the cat in producing several diseases and infection in human and other animals, reveal the urgent need for recognizing these endo parasites as well as their biology and histopathological phenomena.

The aim of the present study was to further investigate the intestinal parasites of the stray domestic cat population of this region and to extend the analysis to several tissue parasitic relationships, particularly zoonotic parasites diseases.

Materials and methods

Fifty stray home cats died accidentally by car crash in the streets of different cities of southwest of Iran, Ilam province ,within the period of one year May 2012 to June2013, their internal spacemen's were collected for parasitic and histological study.Fresh fecal sample direct or indirectly were collected from intestinal tract and studied for parasites. Privet and governmental veterinary clinics especially veterinary student were cooperating regarding collection of cat carcass for this investigation. A questionnaire form was designed to record demographic date related to age, sex, weight, address, number of cat and general appearances of the animal was recorded for each single sample.

After post-mortem examination, the abdominal cavity was opened and the internal organs including stomach, intestine, kidney, liver, heart , lungs and other organs were removed.(2cm of tissue sample of each organ were collected ,preserve in 5%formali ,proceed and stain in H&E for histological study). The small intestine was opened longitudinally with a pair of scissors in 0.85% saline and washed with the same solution until the supernatant had cleared. The mucous was scraped between the blades of a forceps and the contents with epithelial scrapings passed and washed with tap water on a 40- and 60- mesh per inch brass sieves. The filtrate retained in the sieve was washed into a glass container and examined carefully for helminthes parasites.

The contents of the gastrointestinal tract were then carefully assessed with the naked eyes as well as under a stereomicroscope. All parasites recovered, including nematodes were fixed in 10% formalin cleared in lacto phenol and stained with acetocarmine and measured using a micrometer. The identification was carried out through following the key of Soulsby (26).

Fresh fecal samples were examined for cyst and trophozoite of protozoa, egg and larva of helminthes by direct and formalin-ether sedimentation technique followed by microscopy. Also, blood samples of these stray cats were analyzed for haemoprotozoa by smear examination of blood stained with Giemsa's stain. Temperature was monthly recorded. The local ethical committee in veterinary researches as well as the research department in Ilam University approved the proposal of the present study. Associations between parasitism and host characterizes were made using the Chi-square and Fisher exact test and their 95% confidence intervals. Data was analyzed and statistical comparisons were performed using SPSS 16.0.

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Results

Carcass samples were routinely checked for any clinical symptoms, we could only observe some of the cats had anemia or were under weight. More than one fifth of cats (n=43, 86 %) were caring multiple parasitic infection. Generally reporting from this research that the cat in this area were looking a little scruffy and out of condition, underweight and kittens specially had pot-belly lethargy and sometimes diarrhea was observed.

Out of 50 stray home cats included in the experiment, 14 (28%) were male and 36 (72%) were female. After the examination of gastrointestinal tract of cat get accident with the car ten species of internal parasite including protozoa and helminthes had been detected from cat sample. Overalls in this research we could collect two species of protozoa and totally five species of Cestode, and three type of nematodes. Overall total number of 48 cats (96 %) have been found infected with at least one of the parasites. Prevalence of parasites was: Phylum Nematoda: Toxocara cati 32.4%, Toxocara leonina 6.2% and Physaloptera praeputialis 4.5%. Class Cestoda: Dipylidium caninum 27.10% Mesocestoides lineatus 14.2%, Taenia taeniaformis 6.2%, Joyeuxiella echinorhyncoides 8.3% and Taenia hydatigena 1.1%, Phylum Protozoa: Isospora felis 21.2%, Haemobartonella felis 2.34%, Based on this research and our data, we could not found any significant difference in parasitic infection rate between male and female cats. .

The assessment of parasitic infection during different season of the year, and temperature in this study was showed that seasonal variation of parasites throughout the year was not significantly different, and cats found to be infected through all the year in all seasons (Table 1).

Table 1. Comparison of monthly bases prevalence of infestation, and maximum, minimum temperature, in Ilam province.

Month	Positive cats (n)	No of cat	Temperature °C	
			Maximum	Minimum
May	2	3	26	14
Jun	6	6	34	19
July	5	5	38	27
August	9	9	35	26
September	3	3	32	21
October	2	2	30	18
November	2	2	24	11
December	3	3	19	6
January	4	4	17	3
February	5	5	19	6
March	6	7	20	8
April	1	1	23	12

Marked differences in the histology of various tissue of gastrointestinal tract and organs of naturally infected cats were observed. An evident increase in crypt length and mitotic rate of epithelial cells in small intestine was seen. Villi were broader and appeared to be flattened in proximal as well as in distal region of small intestine.

Inflammatory cellular infiltration, vasodilatation, congestion, hemorrhage and necrosis with the destruction of the villi, degeneration of the central lacteal inside the lamina propria of Intestinal villi were evidence. These changes indicated that the infection with the Endo parasite could affect all the organs in the body especially the small intestine.

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Stained samples typically contain localized perivascular mixed inflammation with macrophages, neutrophils, lymphocytes, and plasma cells.

In this study we found 3 cases of cats were in acute parasitic infectious stages, and the tissue study indicated, typically in organs such as the small intestine, mesenteric lymph nodes, liver, adrenal cortex, heart, and skeletal muscle there was fecal to locally extensive areas of necrosis. Severe pulmonary congestion and oedema is also a frequent finding, often accompanied by interstitial pneumonia.

Discussion

The zoonosis infections is a character among some affected cats. Internal parasites found in this research should serve as an alert to public health organization and also physician, veterinarians and cat keeper, especially when research data from long time ago 40 years backed (27) and recent reports (3) show that canine, although disease produce infection in different ways, are still man and animals parasitized by the same species despite of the availability of new chemoprophilatic protocols. This type of experimental report in practice is often the best and only source of information about zoonosis for cat and dogs owners and health departments. According to other research findings reports in our country Iran, cat, dogs and other carnivores like red foxes, cat and golden jackal are reservoirs for so many different protozoan and helminthes parasites (15, 21, 22, 28).

The results of present experiment reveal that nematodes parasites were the most prevalence internal parasites of the cats in this area Toxocara cati 32.4%, three types of parasites species had been identified in this work and that is in agreement with study reports by other research in this field, in Iran (3).

Similar parasitic prevalence infection of T. cati have been recognized and reported from other part of region in Iran (24, 25, 29). The other researcher in this field reported the rate of infection of parasites in cats 3-85 % zoonotic parasitic infection in cat of other parts of the world(17,19,30) and they added that more infection of parasites were found in the kittens of that area. In this study Dipylidium caninum 27.10% belonging to the Cestoda family were the other more frequent species of parasites, this parasites to produce infection, the animals should ingested infected fleas and play as the intermediate host for spraying the disease, cats were found to be infected with some other species of GIT (gastro intestinal tract) parasites which are not harmful to much for cat and the rate of infections were in order 14.2% , 8.3% , 6.2%, 4.5% and1.1% for Mesocestoides lineatus , Joyeuxiella echinorhyncoides , Taenia taeniaformis , Physaloptera praeputialis and Taenia hydatigena Parasites respectively, all of these species needs to produce infections through intermediate host and we have a very few report on these infection in our country Iran, this rate of infections reported in this experiment are in agreement with the study reports of the other researcher and this parasites as we also observed in few alive cats they had only signs of intermittent vomiting (3, 24,25).

We could not found any significant differences in parasitic infection rate between male and female cats, but it could be observed in this study that the cats which were infected were they under body weight, the cat shown not to be on weight according of their age, but cats were active and shown that they are caring stress especially this was more pronounced in the younger cats than the elder cats. Young and old cats in this research were prone to the parasitic infection; we could not found any significant difference in the intensity of infection between the sexes of these carnivores, so this report is in agreement with the other researcher's report like (3, 20, 23). There are reports which believed sex could not have effects on prevalence of parasites in cats (3) any way, there are so

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many stray cats living freely without any disturbance in the various residential areas of Ilam city as well as other cities in Iran where the cat population is rapidly increasing and growing in these urban sites., this could be the best reasons we can significantly contribute to the dissemination of viable parasites eggs into the environment, and a mild, temperate climate of this area appears to enhance the embryo nation of parasites eggs , larvae and in the soil their potential transmission to other animal or humans (3).

Data collected from this research as a result of getting sample directly from GIT of accidental cat carcass which had car accident show that prevalence of parasites like I. felis were 21.2 % and for I. felis was in the rate of 23.7% these parasites were most common protozoa could be found in the present study, the prevalence of protozoa in this area are found to be low and this report has been almost in the same rate of infection found in other area of Iran as in agreement with the report of Borji and his colleague (3).The prevalence of parasites like I. felis is very common and low in all over the world , young kittens are more prone to this infection than the elder one and our report is in agreement with the other researcher results report (26, 29). In our results report and others are in agreement that the young kitten are shedding more oocytes of I. felis in comparison to elder cats ,there is a research report from southern region of Iran that conform the same result that few stray cats their blood smear were infected with the parasites like H. felis (30).

There are some few reports on Giardia parasitic infection from our country Iran (25). In results of this research there were not any records of Giardia parasite this may be due to that we could not use sensitive diagnostic methods for detection of these protozoa, according (3). Whenever fecal sample is collected only, prepared parasitic infection in cats as well as intermittent shedding of parasite stages may lead to the underestimation of the prevalence of diseases and parasitic infections. For routine diagnoses of parasites using PCR is a technique that could be very effective in this report (3).

Marked differences in the histology of various tissue gastrointestinal tract and other organs including of thymus, gland and lung of naturally infected cats was seen in this study. An evident increase in crypt length and mitotic rate of epithelial cells in small intestine was observed. Villi were broader and appeared to be flattened in proximal as well as in distal region of small intestine.

Change in the structure of small intestine and other organs of infected host with endo parasites have been reported by some workers. Toxoplasma gondii and some Endo parasites cause many changes when they invade the cell; those changes are particularly due to the DNA damage that is provoked by the infection (22). Nearly all the internal organs and tissues will be affected after an infection with the Toxoplasma gondii and internal parasite. This will lead to many pathological changes ranging from mild congestion to severe degeneration involving mainly the liver, spleen and pancreas (22, 23).

Conclusion

Results of this study indicate it is necessary that public health authorities and veterinarians in crowed centers were stray cats are looking for food, pay more attention to this phenomenon, and that the general public is informed of the hazards and zoonotic aspects of parasitic infection. During this investigation we observe that cats in this area never received directly any type of de-worming or any other medication during their entire life, they only may get some amounts of medicine through their feed contamination indirectly, so it could be one of the reason that most of the animal in this investigation found to be infected at least with one of the parasite, it could be concluded that present of this type of animal could be hazed for health point of

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view in the society. Endoparasites invade all the layers of the small intestine leading to the destruction of several tissues of different organs of the host.

Our result indicates that for controlling and preventing of zoonosis disease, more attention should be given to this phenomenon.

Acknowledgment

The Ilam university research section financially supported the present study through agreement .No 5/5/2 Dated 20/1/1392 a research grant funding to Dr A.M. Bahrami. The assistance of many students of par- veterinary sciences Ilam University is appreciated.

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