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Occurrence of Toxoplasmosis and other intestinal parasites among stray Cats in Khanyounis Governorate, Palestine

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Abstract

Introduction: Zoonotic parasitic diseases transmitted from animals to human is of concern on the health of the public. The present study was carried out to examine the occurrence of *T. gondii* and other zoonotic enteric parasites including protozoa and helminthes of stray cats in Khanyounis, Gaza strip, Palestine. A cross-sectional study was performed on 93 stray cats which trapped from Khanyounis governorate, and dissected; the observed parasites (cestodes, nematodes and treamatodes) were isolated and processed according parasitology standards methods. Faecal sample was examined by wet mount and flotation for *T. gondii* detection and other protozoa. The present study included 44 males cat (47.3%) and 49 females (52.7%). The general prevalence of intestinal parasitic infection was found to be 90 (96.8%). *T. gondii* was found to be 5 (5.4%), nematodes 41 (44.1%), cestodes 85 (91.4%) and trematodes 23 (24.7%). The most common round worms were *Toxocara cati*, *Toxocara leonina*, while cestodes *Diplopylidium genettae*, *Joyeuiella kofend* and other unknown. It is concluded that zoonotic parasitic diseases especially toxoplasmosis present among stray cats in Khanyounis, Gaza Strip. It is recommended that awareness and education should takes place towards zoonotic diseases among Palestinian society especially that stray cats and house cats are so prevalent in Gaza strip.

Keywords:
cats, parasites, *Toxoplasma gondii*, Khanyounis, zoonosis.

1. Introduction:

Most zoonotic diseases occur in developing countries and in poor rural communities. Prevention of zoonosis in animals and humans can be a tool in the fight against poverty (Leeflang et al., 2008). Domestic and wild fields are the definitive host for several zoonotic parasites, including the protozoan *Toxoplasma gondii* and the ascarid *Toxocara cati*. The host defecated eggs (Toxocara) or oocysts (Toxoplasma) of these parasites are extremely environmentally resistant (Long 1990; Kazacos, 2001), and human infections can occur months or possibly even years after the cat has excreted the parasite eggs. For this reason, cat faeces-contaminated playgrounds, garden soil, sandboxes and other outdoor recreational areas may serve as a source of infection for humans (Holland and Smith, 2006; Lee et al,, 2010). Cats can suffer from a wide range of health problems, including infectious diseases, parasites, injuries and chronic disease. Vaccinations are available for

many of these diseases, and domestic cats are regularly given treatments to eliminate parasites such as worms and fleas (Hendrix and Blagburn, 1983). Toxoplasmosis is important to cats and cat owners for 4 reasons: it is one of the most important zoonotic diseases of people; the human disease affects mainly the unborn and newborn child, which impacts strongly on women (the main owners of cats) and human emotions; cats are the sole definitive host for the causative agent and are one source of human infection; and occasional cats suffer from clinical toxoplasmosis. However, the infection is virtually nonexistent in closed cat populations that are not allowed to hunt, or that are not fed raw or undercooked meat (Pedersen,1991).

Toxoplasma gondii is a heteroxenous parasite, its natural definitive host is the domestic cat and various species of wild felids. Facultative intermediate hosts are mammals and birds in which the infection is mostly asymptomatic, approximately five hundred million people throughout the world have antibodies to *Toxoplasma* without showing clinical signs (Buxton, 1990).

Stray cats are so prevalent in Gaza Strip and live in close association with human. The present study was carried out to examine the occurrence of *T. gondii* and other zoonotic enteric parasites including protozoa and helminthes of stray cats in Khanyounis, Gaza strip, Palestine From the literature there was no such studies regarding zoonotic diseases in Gaza Strip. So this study will give important data about toxoplasmosis and other enteric parasites in stray cats in Khanyounis, Gaza Strip.

2. Materials and Methods

Ethical approval:

An ethical approval was obtained from the Helsinki committee in Gaza Strip dated 3 Feb, 2014, under number:PHRC/HC/02/14.

Cat population and study periods

Ninty three stray cats (*Felis catus*) were captured alive from Khanyounis, Gaza Strip. Cats samplings were conducted during the period of from July, 2013 to May, 2014.

Cat's collection (Trapping)

All cats studied were adults and were captured singly using a baited specially designed cage, 50x50x80 cm, fitted with a trap door. A captured cat was forced to enter a tough sac in which it was brought to the laboratory. Traps were distributed around the houses and near garbage container. Pregnant females were excluded from this study.

Traps were cleaned with hot water and detol every time before distribution. In the early morning the collected cats were transported to the Biology department, The Islamic University of Gaza for the practical part.

Laboratory investigation

Cats were anaesthetized by putting the live ones in a thick transparent polythene bag that helped to observe the movement of cats. A cotton swab soaked in chloroform was used for anaesthetizing each cat.

Determination the sex of each cat

The sex of each cat was determined by viewing the end of the body.

Dissection

The body was opened through a longitudinal incision from the anus to the start of the thorax. So we revealed the gastrointestinal tract of each cat. Then the opening of the abdomen skin region was started at the end of the region and the intestine of the cat was brought out in opened.

Faecal sample collection: For each cat one faecal sample was taken from the last 5 cm of rectum and preserved in 10 % formalin.

Processing of samples (Protozoa Cestodes, nematodes,):

Isolation of Protozoa

A fecal sample was taken from the rectum of each cat in a sterile cup and preserved by Sodium Acetate Acetic Formalin (SAF) to be examined later for the presence of any type of protozoa. Each preserved fecal sample was examined by X10, X40 searching for any protozoa cyst and oocysts according (WHO, 1994).

Isolation and staining of Cestodes

Each cat intestine was examined for the presence of Cestodes and detached worms were removed to warm saline in Petri dishes. Tape worms were left in the cold saline solution to be washed and then preserved in 10% formaldehyde. Parasites or their regions including scolices and proglottids were gently removed from the host body for identification to the species level under the dissecting microscope (Jones *et al*, 1994).

The noted round worms for each cat was taken out of the container and washed by saline solution then it was fixed by 70% ethanol. The isolated nematodes were counted by manual way, and males and females were isolated in separate containers identification was according (Anderson *et al*, 2009). The protozoa and larvae of nematodes and cestodes were photographed by Canon shot power S50 digital camera from the biology department, and the nematode by TV capture camera from the medical technology department and Canon shot power S50 digital camera.

Faecal examination:

Wet mount: One drop of saline was added to each slide and 0.15 mm of faecal sample was mixed and examined under microscope using X10 and X40 (WHO, 1994) according to the protocols recommended by (WHO, 1994).

Measurements, Drawing and Identification:

Measurements were made with a calibrated ocular micrometer. Microphotography was done using same microscope adapted with SONY, 14.1 Mega Pixels camera. The identification and classification of parasites were based on the description given by the following authors: Nematodes - Anderson and Bain (1976). Cestodes - Wardle, Mcleod and Rownisky (1975). Protozoa *(Toxoplasma gondii*)- Levine *et al*, (1980).

3. Results

The present study is the first record regarding the Toxoplasmosis and zoonotic diseases in Khanyounis, Gaza Strip.

Table (1) ***Prevalence of intestinal parasitic infection in*** *Felis catus* ***collected from Khanyounis, in Gaza Strip***

Sex	Number examined	Number of positive	Prevalence (%)
Males	**44**	**42**	**95.4**
Females	**49**	**48**	**97.9**

Table (2) Prevalence of intestinal parasitic infection by sex in *Felis catus* **trapped from Khanyounis in Gaza Strip (n=93**

Intestinal parasites class	Males (n=26) %		Females (n=15) %		χ^2-P-value
Protozoa	1	(2.3)	4	(8.2)	1.581 (0.216)
Nematodes	21	(47.7)	20	(40.8)	0.449 (0.322)
Cestodes	41	(93.2)	44	(89.8)	0.338 (0.419)
Trematodes	10	(22.7)	13	(26.5)	0.180 (0.428)

Table (3) Occurrence of double, triple infection in *Felis catus*

Double/triple infection	No. of positive	%
Cestodes + nematode	**27**	**29.5**
Nematode +protozoa	**5**	**5.4**
Nematode +cestode+protozoa	**13**	**14.0**
Cestodes + protozoa	**12**	**12.9**
No-double infection	**36**	**38.7**

4. Discussion

Stray cats are so prevalent in Gaza Strip so the risk for transmission of parasitic diseases are high. Zoonotic diseases are so prevalent worldwide, this topic is very interesting and important locally in Gaza strip. The overall prevalence of gastrointestinal parasitic infection was 88.6% (95% CI = 82.5-94.7) in which 88.3% of dogs and 89.3% of cats were infected with at least one parasites species, respectively in Peninsular Malaysia (Ngui et al., 2014).

Table (4) Prevalence of protozoa, nematodes and cestodes in *Felis catus* trapped from Khanyounis in Gaza Strip (n=93)

Protozoa	NO.	%
Toxoplasma gondii	5	5.4
Nematodes	10	24.4
Toxocara felis	1	1.1
Toxocara cati	26	28.0
Toxocara canis	1	1.1
Cestodes		
Hydatigerai taeniaeformis	6	6.4
Joyeuxiella kofend	25	26.8
Diplopylidium genettae	15	16.1
Taenia taeniformis	4	4.3
Diplylidium caninum	25	26.8

The examined cats from India showed mixed helminthic infections, with an overall prevalence of 85.2% (BotharKur and Mukharjee, 2011) and 41% from Iran (Yagoob and Yaghuob, 2014). The results of this study reported five helminthes species: *Toxocara cati* (13%), *Ancylostoma tubaeforme* (4%), *Physaloptera preputialis* (8%), Dipylidium caninum (16%), *Taenia taeniformis* (7%), four protozoal species: *Toxoplasma gondii* (6%), Sarcocyst spp. (11%), Isospora spp. (14%) and Giardia spp. (9%) and one arthropod species; mites eggs (12%) (Yagoob and Yaghuob, 2014).

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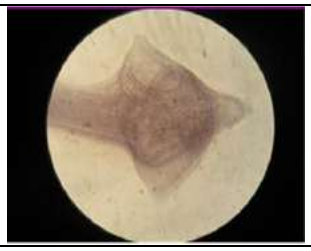
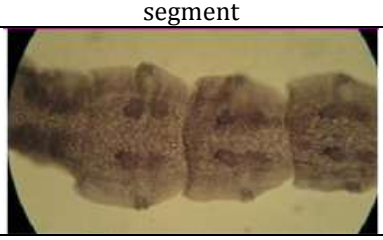
<tr><td>  </td><td>  </td></tr>
<tr><td>Fig.(A)- Hydatigerai taeniaeformis scolex</td><td>Fig.(B)- Hydatigerai taeniaeformis gravid segment</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Fig.(C)- Joyeuxiella kofend scolex</td><td>Fig.(D)- Joyeuxiella kofend mature segment</td></tr>
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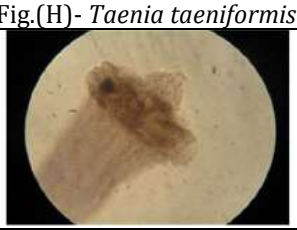
<tr><td>Fig.(E)-. Joyeuxiella kofend gravid segment</td><td>Fig.(F)-. Diplopylidium genettae scolex</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Fig.(G)- Diplopylidium genettae gravid segment</td><td>Fig.(H)- Taenia taeniformis</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Fig.(I)-. Dipylidium caninum mature seg.</td><td>Fig.(J)-. Dipylidium caninum scolex</td></tr>
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<tr><td>Fig.(L)-. Dipylidium caninum gravid seg.</td><td>Fig.(M)-. Dipylidium caninum gravid segment</td></tr>
<tr><td colspan="2">Fig 1. Cestodes types</td></tr>
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Fig.(A)- *Toxocara cati* posterior end

Fig.(B)- *Toxocara cati* anterior end

Fig.(C)- *Toxocara leonine* anterior end

Fig.(D)- *Toxocara leonine* posterior end

Fig.(E)- *Isospora sp.*

Fig.(F)- *Toxocara cati* egg

Fig 2. Nematoda/protozoa types

The prevalence of *Taenia taeniaformis* (6.4%) was lower than the results from Iran (15%). (Arbabi and Hooshyar, 2009), in Qatar (75.8%) (Abu-Madi et al., 2008), from Egypt (41.16%) (Hasslinger et al.,1988). The prevalence of *Toxocara canis* (1.1%) was very lower from that recorded in Ireland (82.6%) (Lorcain, 1994). The prevalence of *Toxocara cati* (28%) was lower than that recorded in India (59,3%) (BotharKur and Mukharjee, 2011). But other reports showed higher prevalence from which recorded in Qater (0,8%) (Abu-Madi MA et al, 2008), in Iran (13,3%) (Arbabi and Hooshyar, 2009). The prevalence of cestodes *Dyplopliydium spp*. (43%) is similar to the prevalence in Qatar (42.8%) (Abu-Madi MA et al,2008), and lower from its prevalence in Egypt (64.6%) (Hasslinger et al, 1988). Isospora sp. was found in the present study other studies reported Isospora felis in Portugal (Duarte et al., 2010). It is worth mention that toxoplasmosis were recorded in a number of literature in Gaza Strip (AL-Hindi and Lubbad, 2009; Al-Hindi, et al., 2010).

Where *Toxocara cati* could be transmitted to human through swallowing Toxocara eggs (CDC, 2017).

The preset study is recording for the first time such prevalence and existence to variant types of zoonotic intestinal parasites either protozoa, nematodes and cestodes. This will constitute a very important issue for veterinarians and health authorities. Also, the contact with these cats cann't be avoided and their defecation in farm, houses yards may bring the risk for contamination of food to the public.

Conclusions:

1. Stray cats harbor different types of intestinal parasites.
2. Form the present study we have an evidence for the zoonotic diseases (intestinal parasites of cats) in the locality of Khanyounis, Gaza Strip.

Recommendations:

1. Stray cats should be controlled in Khanhyounis and Gaza Strip.

2. Health education sessions should be launched to the public towards the risk sof these parasites.

3. The municipality should takes it measures against cats.

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