Introduction

Toxoplasmosis is an infectious diseases caused by protozoal parasite called *Toxoplasma gondii*, which is an intracellular coccidian of apicomplexan phylum. This disease is a major zoonosis [1], with worldwide distribution [2]. The role of domestic cats in spread of Toxoplasmosis is very critical because they are definitive host of this protozoal parasite where oocyte are shredded. All other mammalian hosts including human and birds considered as intermediate host [3].

After cats had infected, they shedded million of oocytes [4], consumption of food and water with shedded oocytes affect humans and livestock, leading to abortion, neonatal mortalities and other congenital complications in human and animals [5].

In spite of the infection can occurred congenitaly or by consumption of meat of infected animals with *T. gondii*, several studies concluded that *T. gondii* infection cannot maintained in the surrounding environment without presence of cats [6].

In human populations where pet cats were in close contact, seroprevalence of IgM and IgG antibodies agonist *T. gondii* should delivered [7].

Serosurvey of *T. gondii* specific antibodies in cats is much needed as it assess level of oocytes contamination of impacted environments [8].

This study was planned to study serological prevalence of *T. gondii* in house hold cats.

Material and Methods

Examined Animals

The 212 cats of different sex, breed and age as shown in Table 1. Were collected from many urban and rural districts in Giza province. These cats live in houses, cats visited Veterinary Clinic at 6th October City, Giza Province for clinical check up and testing against Toxoplasmosis.

Epidemiological data

Epidemiological data regarding the age, area, hunting habit, access to outside, nature of pet cats food including uncooked meat like luncheon or no, were supplied by questionnaire and interview with the owners of pet cats according to Ahmed et al. [9], Sedlak and Bártová [10].

Keywords: Serological diagnosis, Toxoplasmosis, Cats, rapid chromatographic immune assay (IC), Egypt.
Sampling
Blood samples were collected from Sephanous or juglar ven of examined pet cats with minimal doses of sedation according to Animal Welfare protocols (Ahmed et al. [9]).

Collected blood samples centrifuged at 3000 rpm for 15 minutes for serum separation according to Ahmed et al. [9] and Sedlak and Bártová, [10].

Serological diagnosis
Rapid chromatographic immune assay (IC) was carried out for qualitative detection of Feline Toxoplasma IgM and IgG antibodies in Feline serum [11]. One step Feline Toxoplasma IgM and IgG test kit supplied by Bionote, Korea.

Statistical analysis
Statistical analysis was done using Chi-square test to study effect of sex, age and breed according to Smith [12].

Results
The results of rapid chromatographic immune assay (IC) are shown in Table 2 which includes distribution of IgM and IgG antibodies presence in different 4 serological groups. The percentages of each group to the total number of examined cats were 3.77%, 25.94%, 5.18% and 61.32% for first group [IgM (+ve) IgG (+ve)], second group [IgM (-ve) IgG (+ve)], third group [IgM (+ev) IgG (-ve)] and fourth group [IgM (-ev) IgG (-ve)], respectively.

Table 3 indicates distribution of positive reactors (overall positive) among male and female cats: 39 positive reactors were recorded in males, while 43 positive reactors were recorded among female cats.

Table 4 illustrates distribution of positive reactors among different breeds. It showed 33, 5, 6, 24 and 14 positive, while 65, 9, 14, 18 and 24 were negative in Persian, Main coon, Siam, Egyptian Mau and mix breed, respectively.
TABLE 3. Positive cats (overall positive) among different sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>39</td>
<td>65</td>
</tr>
<tr>
<td>Female</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>130</td>
</tr>
</tbody>
</table>

TABLE 4. Distribution of overall positive reactor cats among different breeds

<table>
<thead>
<tr>
<th>Breed</th>
<th>Cats</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>Persian</td>
<td>33</td>
<td>65</td>
</tr>
<tr>
<td>Main coon</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Siam</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Egyptian Mau</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>Mix breed</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>130</td>
</tr>
</tbody>
</table>

Table 5 illustrates distribution of positive reactors among different age groups. It showed 48, 18, 12 and 4 positive, while 64, 22, 28 and 16 were negative in over 12 months, 9-12 months, 6-9 months and 3-6 months, respectively.

Chi-square test was also used to study the effect of breed and age on the results of the examined cats. We found that both breed and age had effects on the results by another mean there were significant differences between different cat breeds or different age group (P<0.05).

TABLE 5. Distribution of overall positive reactor cats among different age group

<table>
<thead>
<tr>
<th>Results</th>
<th>3-6</th>
<th>6-9</th>
<th>9-12</th>
<th>Over 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall positive</td>
<td>4</td>
<td>12</td>
<td>18</td>
<td>48</td>
</tr>
<tr>
<td>Overall negative</td>
<td>16</td>
<td>28</td>
<td>22</td>
<td>64</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>40</td>
<td>40</td>
<td>112</td>
</tr>
</tbody>
</table>

Discussion

In this study serological diagnosis used by applying rapid IC for detection of both IgM and IgG antibodies against *Toxoplasma gondii* in sera of examined cats was rapid and accurate method for diagnosis, as recommended by Ahmad et al., Luo et al. [9, 11].

Toxoplasmosis in cats present in acute or chronic form as stated by Gaskell et al., Shaw and Ihle [13, 14]. Rapid IC assay succeeded in detection of IgM antibodies against *Toxoplasma gondii* in 19 cats (8.96%). Theses 19 IgM sero positive cats represented the acute form of *T. gondii* infection [15], while 63 cats (29.71%) were positive for IgG antibodies against *T. gondii* represented the chronic form [16, 17].

The 82 sero positive cats considered as overall positive as with a percentage (38.67%) among population of this study, similar results recorded by several authors [9, 18-26] in different geographical parts all over the world.

The results recorded that there was significance difference between different age.
groups, by another mean age has significance effect on the on the prevalence of Toxoplasmosis, but higher percentage was detected in cats over 1 year in age and this may be attributed to multiple exposures of these old cats for infection \[27, 28\]. While number of overall positive cats decrease with decrease in age significantly due to less exposure times \[27\].

The overall positive reactors were high in certain breed like Egyptian Mau and Mix breed. These findings attributed to hunting habits and getting outdoor to houses gardens as mentioned by Gyroke et al. \[29\] and Opsteeg et al. \[30\].

Statistical analysis were carried out to study the effect of sex, age and breed using Chi-Square Test . Smith \[12\].

There are significant differences detected between different sex, breed and age group, respectively as stated by Awad et al. \[31\].

Conclusion: Toxoplasmosis is well known as major zoonosis, causes fatal health problems for human. Cats considered major source for human infection and environment contamination. Toxoplasmosis cannot be diagnosed clinically in cats, so serological diagnosis is the only rapid and accurate method for detection of Toxoplasma gondii infection in household cats.

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Conflict of Interest Statement
The author whose name is listed immediately below certify that he has no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria, educational grants, participation in speakers’ bureaus, membership, employment, consultancies, stock ownership, or other equity interest, and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

References


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SEROLOGICAL DIAGNOSIS OF TOXOPLASMASIS IN HOUSEHOLD CATS IN EGYPT

This study aimed to use serological diagnosis to quickly detect Toxoplasmosis in different breeds and strains of household cats from different age groups in the Giza Governorate. Serum samples were collected from 212 cats living in different areas. The samples were tested for Toxoplasma gondii-specific IgG and IgM antibodies using immunocytometry. The statistical analysis was performed using the Chi-square test to study the effect of gender, breed and age on the results. The results showed that 29.71% of the cats were infected with Toxoplasma gondii, 8.96% with IgG antibodies, and 82% of the positive samples contained antibodies in the serum of the Egyptian cat and cats with an average age of more than one year. The statistical analysis showed significant differences between the different breeds, strains and age groups. Summary: This study concluded the need to use serological diagnosis through immunocytometry to detect Toxoplasma gondii. This test is a rapid and accurate method for diagnosing toxoplasmosis.