

***Trichomonas gallinae*, Prevalence and Histopathology in Domestic Pigeons in Sadat District, Egypt**

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ABSTRACT

The present study was carried out on 430 domestic pigeons (318 nestlings and 112 adults) from January to December 2020 in Sadat City, Egypt to determine the prevalence of *Trichomonas gallinae* and their histopathological effects. Pigeons were clinically examined for trichomoniasis. Birds with oral lesions of *T. gallinae* were subjected to wet mount preparations and Giemsa stained smears from their mouth, esophagus, and crops. Histopathological examination of infected tissues was performed. The results observed revealed that the prevalence rate of *T. gallinae* was 4.2 % (18/430). The infection rate was higher in nestlings (4.4%) than in adults (3.6%). The highest infection rate was recorded during summer (5.8%) while the lowest rate was recorded in winter season (1.9%). Moreover, morphological descriptions of recovered *T. gallinae* organisms were reported. Microscopically, the oral caseous masses revealed plasma cell and lymphocyte infiltration linked to several multinucleated foreign body giant cells and several round to oval pale eosinophilic structures with basophilic properties nuclei which represent *Trichomonas gallinae* parasites.

Keywords: *Columba livia*, Histopathology, *Trichomonas gallinae*, Sadat district.

INTRODUCTION

Domestic pigeons have a potential role in zoonotic diseases transmission due to their contact with humans, wild and domestic birds, and animals where pigeons are used as a source of proteins and as lab animals (Cooper, 1984; Harlin, 1994; Adang et al., 2008 and Radfar et al., 2011). The main host of *Trichomonas gallinae* (*T. gallinae*) is Columbidae, especially the domestic pigeon, so it is believed that they are responsible for the global prevalence of this parasite (Harmon et al., 1987).

The *T. gallinae* also can infect a wide range of other birds, such as psittacine birds, bustards, and fowl (Bushnell, 1942; Baker, 1996 and Silvanose et al., 1998).

T. gallinae, is a parasitic flagellated protozoan with pyriform to ovoid shape trophozoites and is divided by binary fission (Amin et al., 2014). This flagellate affects the upper digestive and respiratory tracts causing avian trichomoniasis which has clinical and subclinical forms. Most infections are subclinical while the clinical form is

characterized by severe signs and high mortalities in young pigeons (Levine, 1985; Bunbury et al., 2008 and Robinson et al., 2010). Pigeons are infected through consuming contaminated food or water with trophozoites, when nestlings are fed crop milk from infected parents during courtship via billing (Stabler, 1947). This parasite is usually highly prevalent in nestling pigeons than in adults where the latter can become infected for a long period and represent a continuous infection source for their young and transmit the parasite when they feed their young (Soulsby, 1986). The lesions observed vary from mild mucosal ulceration to large caseous or granulomatous masses that may obstruct the lumen of the esophagus causing birds death from starvation (Narcissi et al., 1991; Grabensteiner et al., 2010 and Borji et al., 2011). Aim of this study was to determine the prevalence of *T. gallinae* in the Sadat City district, Egypt.

MATERIALS AND METHODS

Pigeons and area of study:

430 pigeons of different ages in the Sadat City, Egypt were clinically examined from January to December 2020 to determine the prevalence of *Trichomonas gallinae*.

Wet mount preparations:

The specimens were taken from mouth lesions, throat, esophagus, and crop of clinically infected pigeons. Cotton swabs moistened with warm water were used for sample collection. A drop of the fluid sample was then taken, placed on a glass slide, and covered with a cover slip to be examined immediately by the light microscope under different magnifications (10x and 40x) to detect the jerky movement of *T. gallinae* trophozoites (Samour and Naldo, 2003).

Stained smears:

Swabs were taken from the upper digestive tracts of infected pigeons, mixed with drops of sterile distilled water, and then spread on clean new glass slides. Absolute methanol was used for the fixation of air-dried smeared slides for one minute and then staining with Giemsa stain. Observation of the stained smears was performed under an oil immersion lens (100x). *T. gallinae* parasites were recognized according to (Levine 1985).

Histopathological examination:

Samples were collected from crop of oral cavity, esophagus and then preserved for three days in 10% neutral buffered formalin and then sent to Pathology lab, Faculty of Veterinary Medicine, University of Sadat City, Egypt for histopathological examination. Washing, dehydration, and embedding in paraffin were performed for these samples. Hematoxylin and eosin (H&E) staining on 5 µm sections was used for light microscopic examination (Bancroft and Gamble, 2002).

RESULTS

Prevalence of *Trichomonas gallinae*:

Results Table (1) displayed the prevalence of *T. gallinae* in examined pigeons. Overall infection rate was 4.2% (18 out of 430). Regarding age, infections were found in 4.4% of nestlings (14 out of 318) and 3.6 % of adults (4 out of 112) (Table 1)

The highest infection rate of *Trichomonas gallinae* was recorded during the summer season (5.8 %) followed by spring and autumn seasons with an infection rate of 3.4% and 2.9% respectively, while the lowest infection rate was recorded in the winter season (1.9 %), (Table 2).

Histopathological examination:

Gross lesions of oral trichomonosis, there were caseous materials covering a portion of the oral mucosa and partially obstructing the laryngeal entrance (Fig. 1). Microscopically,

these caseous masses showed invasion of lymphocytes, and plasma cells associated with several multinucleated foreign body giant cells and a several of pale eosinophilic round to oval structures with basophilic nuclei (Fig. 2b, 2c, 2d). Mandible muscle showed degeneration of muscle fiber, Lymphocytes, and plasma cells infiltration associated with numerous round to oval, pale eosinophilic with basophilic nuclei which, consistent with trichomonads (Fig. 2a)

The Morphological description of recovered *T. gallinae*:

Morphological descriptions of *T. gallinae* were recorded. Trichomonads in wet mount preparation were detected by their jerky movements in wet preparation (Fig. 3d.). While in stained smears, *Trichomonas gallinae* were microscopic small pear-shaped bodies, up to 18 µm size. They were flagellated protozoa, each with four anterior flagella, protruded axostyle from the posterior end, and short undulating membrane (Fig. 3a, 3b, 3c).

Table (1): Effect of age on the infection rate of *Trichomonas gallinae* in domestic pigeons in Sadat City, Menoufia governorate, Egypt:

| Age | No. examined | No. Infected | % of infection |
|--------------|--------------|--------------|----------------|
| Nestlings | 318 | 14 | 4.4 % |
| Adults | 112 | 4 | 3.6 % |
| Total | 430 | 18 | 4.2 % |

Table (2): Seasonal prevalence of *T. gallinae* in domestic pigeons in Sadat City, Menoufia governorate, Egypt:

| Season | No. examined | No. Infected | % of infection |
|--------------|--------------|--------------|----------------|
| Spring | 118 | 4 | 3.4% |
| Winter | 54 | 1 | 1.9% |
| Summer | 190 | 11 | 5.8% |
| Autumn | 68 | 2 | 2.9% |
| Total | 430 | 18 | 4.2% |

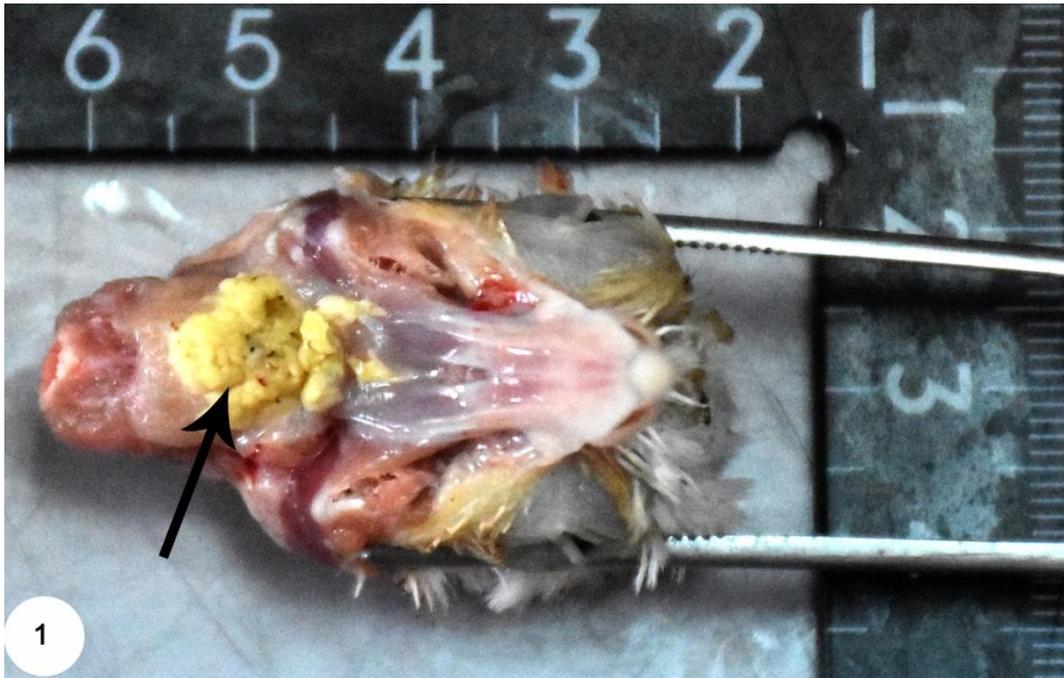


Fig. (1). Gross lesions of oral trichomonosis in pigeon. An abundance of yellow, caseous material covering a portion of the oral mucosa and partially obstructing the laryngeal entrance.

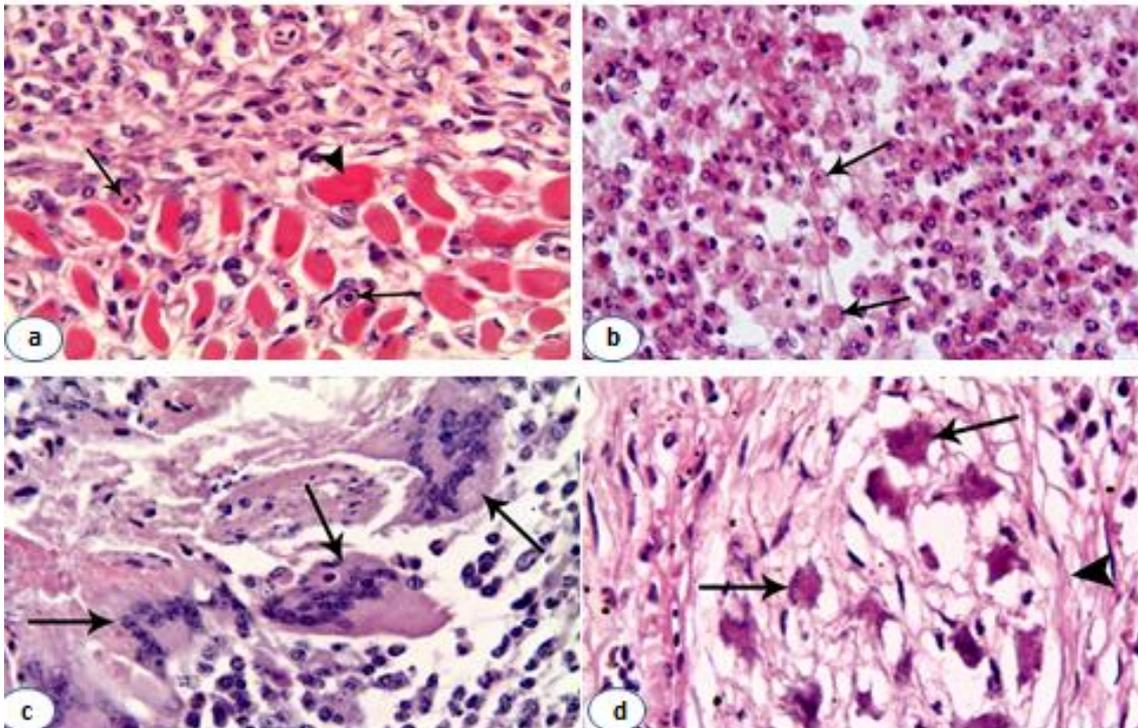


Fig. (2a): Mandible muscle. Showing degeneration of muscle fiber (arrowhead), lymphocytes, and plasma cell infiltration associated with numerous round to oval, pale eosinophilic with basophilic nuclei (arrows), consistent with trichomonads. H&E, 40x.

Fig. (2b): Mandible muscle. Showing degeneration of muscle fiber (arrowhead), Lymphocytes, and plasma cell infiltration linked to numerous pale eosinophilic

structures, round to oval, with basophilic nuclei (arrows), consistent with trichomonads. H&E, 40x.

Fig. (2c): oral caseous mass. Showing lymphocytes and plasma cells invasion in addition to several multinucleated foreign body giant cells (arrows). H&E, 40x.

Fig. (2d): oral caseous mass. Showing numerous eosinophilic structures containing basophilic nuclei (arrows), in accordance with trichomonads inside a granulomatous lesion (arrowhead).H&E, 40x.

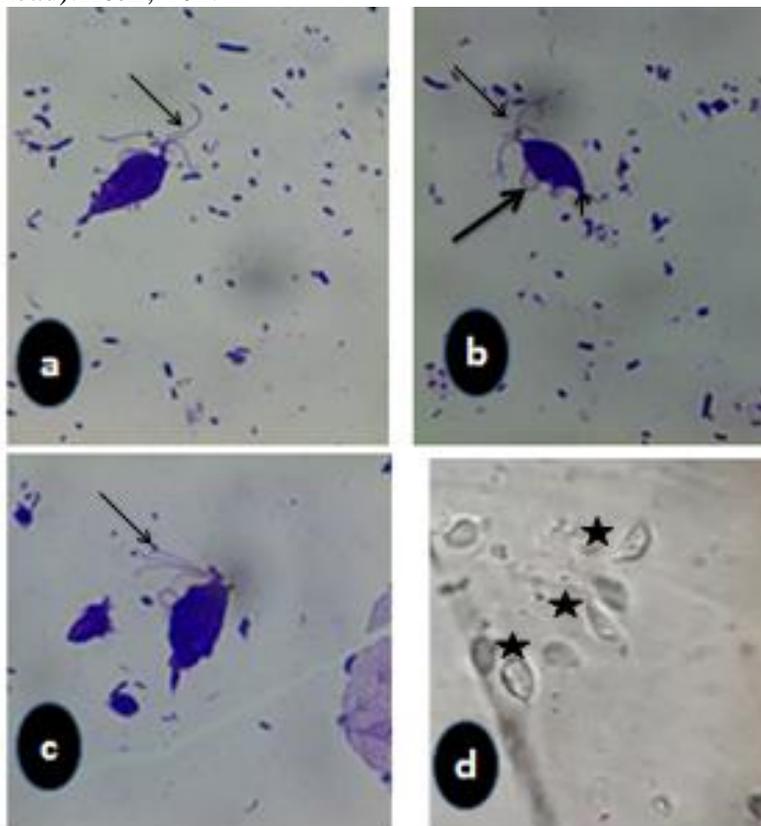


Fig. (3a), (3b), (3c): Micrographs of *T. gallinae* organisms, isolated from the oral lesions of infected pigeons .pyriform flagellate protozoan parasites have 4 anterior flagella (thin arrow), an undulating membrane (thick arrow), and an axostyle (arrowhead), stained with Giemsa, 100x.

Fig. (3d): Micrograph of *T. gallinae* organisms (stars) in direct wet mount preparation, 40x.

DISCUSSION:

The present study was carried out on 430 domesticated pigeons to determine the prevalence of *T. gallinae* and their pathological lesions in the infected tissues. The infection rate of *T. gallinae* in the current study was 4.2%. The obtained rate was higher than that recorded in Minoufiya governorate, Egypt (1.9%) by El-Khatam et al. (2016). While *T. gallinae* infection rate recorded through this study was lower than those reported in Qaliobia

governorate, Egypt (68.92%) by Abd El-Rahman et al. (2008); Iran (57.84%) (Radfar et al., 2012); Seychelles (47.1%) (Bunbury, 2011); United States (36%) (Girard et al., 2014); and Slovenia (7.9%) (Dovc et al., 2004).

The variations in the infection rate might be due to examination methods and *Trichomonas gallinae* detection from subclinical infections in prior surveys.

The highest *Trichomonas* infections were recorded during the summer

(5.8%) while their lowest infection rate was recorded in the winter season (1.9%)

The age of the examined pigeons affected the infection rate of *Trichomonas gallinae* in the current study. The infection was higher in the nestlings (4.4%) than in the adults (3.6%), and this finding was agreed with (Radfar et al., 2012 and El-Khatam et al., 2016).

In the current study, grossly; there were caseous materials covering a portion of the oral mucosa and partially obstructing the laryngeal entrance.

Microscopically, these caseous masses showed lymphocytes and plasma cell infiltration associated with several multinucleated foreign body giant cells and there are numerous pale eosinophilic structures, round to oval, with basophilic nuclei. These findings agreed with Abd El-Rahman et al. (2008); Borji et al. (2011); El-Khatam et al. (2016) and Martínez-Herrero et al. (2014).

CONCLUSION

The occurrences of *Trichomonas gallinae* in pigeons was affected by age of the examined pigeons in Sadat district, Egypt. The presence of *Trichomonas gallinae* was confirmed by microscopic examination of wet smears, stained preparation and histopathology.

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