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Epidemiological Aspects of Pigeon Trichomonosis in Center of Iran

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Abstract: This study was carried out during a 24-month-period (2004 till 2006) on 418 pigeons which were referred to the clinic of veterinary network. For diagnosis of *Trichomonas gallinae*, wet swab were taken from the oropharynx and also their oropharynxes for the presence of caseous lesions were tested by observation. The infestation rate with *T. gallinae* was 79.11% (125 out of 158) in 2004-2005 and 64.61% (168 out of 260) in 2005-2006 and total prevalence rate was 70.09%. There is a gradual rise in prevalence rate of trichomonosis from early of winter to end of summer. In general, the prevalence rate of disease reaches a peak in summers and in second 12 months, probably because of sanitary respect and prevention and control executions was decreased. Large caseous lesions did not observe in referred pigeons. It is concluded that the combination of a high prevalence of *T. gallinae* with a low rate of pathologic changes is the result of an evolutionary adapted parasite-host relationship and low virulence of strain caused trichomonosis in Center of Iran.

Key words: Pigeon, prevalence, *T. gallinae*, trichomonosis, center of Iran

INTRODUCTION

Study area covers area of 16,000 km² (31.92° North, 54.37° East.) and located at 1203 meters above sea-level. It is located beside the central mountains, far from the sea, adjacent to the desert Kavir and in the shadow rainy region and its climate is generally very dry, with cold winters and hot summers (Wikipedia, 2007).

In the study area in centre of Iran the pigeons (*Columba domestica*) are inhabitant of graveyards, public parks and all other urban area (warm and dry) as well as around a large number of aviculturists.

The protozoan flagellate *T. gallinae* is the causative agent for the potentially lethal avian disease trichomonosis (Krone *et al.*, 2005). In general, *T. gallinae* inhabits upper digestive tract of its host. Pigeons and doves of the family Columbidae are the most common hosts of *T. gallinae* (Stabler, 1969) and virulent strains mortality may reach as high as 50% before sufficient protective immunity develops (McDougald, 2003). It is more prevalent among domestic pigeons and wild doves than chickens or turkeys. Some strains of *T. gallinae* cause high mortality in pigeons and doves (Aiello, 1998). Experimental studies revealed marked differences in pathogenicity and virulence among different strains of *T. gallinae* (Stabler, 1977; Stabler and Braun, 1979). Parent pigeons transmit to their offspring in contaminated pigeon milk. Trichomonosis in pigeons, doves and domestic fowl known as roup and canker is characterized, in most cases by caseous accumulation of throat and usually by weight loss (Aiello, 1998). There is a high prevalence of disease in captive birds in the Middle East (Samour *et al.*, 1995; Krone and Cooper, 2002). It is also the most important infectious disease in free-ranging birds of prey in general (Keymer, 1972). As prevalence of Trichomonosis in pigeons in Center of Iran had not previously studied, the aim of this study is to investigate the prevalence and seasonality of *T. gallinae* in pigeons in this area and its seasonal distribution.

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MATERIALS AND METHODS

Yazd province has an area of 73,467 km², is located in center of Iran. This study in Yazd city (capital of province) in area of 16,000 km² (31.92° North, 54.37° East.) was carried out (Wikipedia, 2007). In this study, during 24 months from September 22nd 2004 to September 22nd 2006, 418 pigeons that referred to veterinary network clinic of Yazd were examined for *T. gallinae* infestation. For this purpose pigeon's oropharynx were checked for caseous lesions (Aiello, 1998). We collected specimens by swabbing the surface areas of the mouth and upper crop of each pigeon for about 5 sec with a dry cotton-tipped swab (Cover *et al.*, 1994). The specimen was immediately transferred to the 0.5 mL sterile water and 30 µL of this sample was examined using a light microscope at 100X magnification.

Statistical Analysis

Data were analyzed using chi-square test of SPSS software (version 14) to check for differences between seasons and years. Values of p<0.05 were considered significant.

RESULTS AND DISCUSSION

In the present study, we demonstrated prevalence rate of 418 pigeons for *T. gallinae* infestation, during 24 months in central Iran (Table 1). Prevalence rate caused by *T. gallinae* was found 79/11% in first 12-month-period and 64.61% in second 12-month-period. Totally, 70.09% of the pigeons were infested. Infestation had a relative decrease from September till December and started to increase from March till July (Fig. 1). Also infestation decreased in second 12-month-period (p>0.05). On the other hand, it increased with arrive to summer and autumn. It reached to a pick in summer because parent

Table 1: Prevalence rate of *T. gallinae* in 418 pigeons examined in Yazd province, Central Iran during 22nd September 2004 to 21st September 2006

Prevalence rate	Months											
	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.
2004-2005												
Positive	10	11	8	7	7	7	11	13	14	13	16	8
Negative	1	4	4	5	1	3	4	4	4	3	1	1
2005-2006												
Positive	16	7	11	13	7	9	8	20	23	20	14	20
Negative	6	3	9	6	5	5	7	12	11	8	4	16

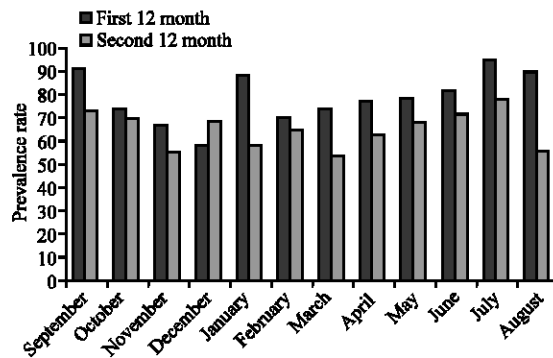


Fig. 1: Monthly prevalence rate of *T. gallinae* in Center of Iran during 22nd September 2004 to 21st September 2006

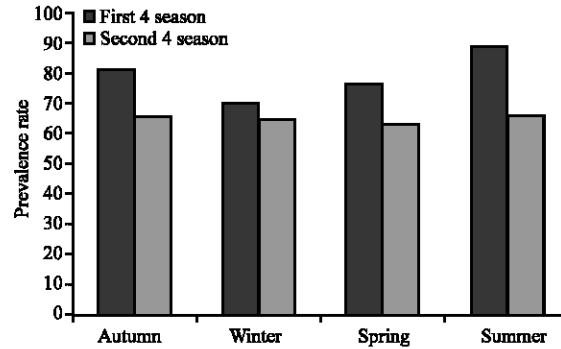


Fig. 2: Seasonality prevalence rate of *T. gallinae* in Center of Iran area during autumn 2004 to autumn 2006

pigeons transmit the agent to their offspring in contaminated pigeon milk in spring which clinical signs appear in later seasons (especially in summer (Fig. 2). According to the statistical analysis there were no significant differences between years but there was a considerable differences between spring and other seasons ($p < 0.05$) and there was a substantial correlation between seasons and infestation rate of trichomonosis.

Caseous lesions were observed in few pigeons; however, all of them were positive with *T. gallinae*. None of referred pigeons had large caseous lesions (diameter = 1 cm) that revealed characteristic of late-stage trichomonosis.

There is not any quantitative information about the prevalence of *T. gallinae* in pigeons in understudied area. On the other hands, we could confirm the presence of *T. gallinae* that caused lesions related to trichomonosis among other causes of stomatitis (e.g., capillaritis, vitamin A deficiency, pox and fungal infections) especially in the early stages (Wieliczko *et al.*, 2003).

In the present study we realized that total prevalence rate of Trichomonosis in examined pigeons ($n = 418$) during 2004 till 2006 was very high (70.09%). Thus hyper endemic disease was shown by this result. Other epidemiologic studies on different birds announced lower prevalence in various regions such as: a very low prevalence of 2.7% in Cooper's hawk in three distinct study areas of North America (Rosenfield *et al.*, 2002) a low prevalence of 9% in goshawk nestlings from an exurban study area (Boal *et al.*, 1998) and a moderate prevalence of 36% in Bonelli's eagle nestlings from Spain (Real *et al.*, 2000). Even the highest advertised prevalence of 50% in Bonelli's eagle nestlings from Southern Portugal (Hoefle *et al.*, 2000), is also lower than trichomonosis prevalence in present study. Hoefle *et al.* (2000) reported a high prevalence of trichomonosis in Bonelli's eagle nestlings from Southern Portugal. They announced 14 of 16 examined eaglets (87.5%) had oropharyngeal or esophageal lesions. However, these may (at least partly) be caused by other agents except *T. gallinae* (see above). They also examined another 12 nestlings both macroscopically and by culture. Of these, only six were infected with *T. gallinae*, but ten eaglets had macroscopic lesions in the oropharynx (50%).

Total prevalence rate of trichomonosis in understudied pigeons during 2004 till 2006 was 70.09%. The most referred pigeons were in spring and summer during both first and second 12-month-period (Table 1). Marked increase in frequency in second 12-month, probably was because of enhancement of hygienic notifications of veterinarians. On the other hand, in the second 12-month the negative test result increased as well. Therefore the prevalence rates nearly stayed the same. There was a gradually rise in prevalence rate of trichomonosis from early of winter to end of summer (Fig. 2).

In general, the prevalence rate of disease reached a peak in summer. Second year had lower prevalence rate in comparison with first year, probably because of sanitary respect and prevention and control management. Prevalence rate in second year reaches to an almost constant amount (62.96 to 65.85%). But this rate in first year had more alternative differences percent (70 to 88.09%) ($p > 0.05$).

We revealed that there was not any death in examined pigeons ($n = 418$) during study period due to Trichomonosis. In this point of view there are many reports that based on no death in other studies (Rosenfield *et al.*, 2002; Boal *et al.*, 1998). But in Great Britain, mortality of Northern Goshawk Nestlings caused by trichomonosis was high. Cooper and Petty (1988) reported a mortality rate of 10.5% in goshawk nestlings ($n = 5134$) during 1972 to 1985. They discussed this problem is result of a seasonal, highly virulent strain of *T. gallinae* activity.

In a survey of 39 Bonelli's eagle nestlings from Spain in 1993, 14 eaglets (36%) were positive for *T. gallinae*, including one nestling that died due to trichomonosis. However, only two chicks had lesions attributed to *T. gallinae* infestation. In another study from 1986 to 1993, 4 out of 179 macroscopically examined eaglets (2%) died due to trichomonosis (Real *et al.*, 2000).

Affected birds with *T. gallinae* had large oropharyngeal lesions, which probably lead to impaired food intake followed by marked body condition losses. The low mortality rate could be caused by strains with low pathogenicity, which would produce and support protective immunity of birds to infections with highly virulent strains (Stabler, 1969).

It could be concluded that *T. gallinae* strains in understudied birds weren't virulent enough to cause mortality. Therefore except expenditure of treatment and control of disease there were no other economical losses for aviculturist of pigeons.

Considering the low mortality of nestlings because of trichomonosis, the high breeding success and the steadily increasing population in our study area, we conclude that trichomonosis has little demographic impact on the population. Combination of a high prevalence of *T. gallinae* with a low rate of pathologic changes was the result of an evolutionary adapted parasite-host relationship.

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