Short Communication

Prevalence of canine parvovirus infection in Grand Tunis, Tunisia

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ABSTRACT

Objective: The aim of this work was to describe the prevalence of Canine parvovirus type 2 (CPV-2) infection in young dogs of clinical cases presented at the National School of Veterinary Medicine clinic coming from four different governorates of Tunisia, according to epidemiological parameters: sex, breed, age, period, and vaccination status.

Materials and methods: 168 domestic juvenile dogs aged between one and seven months were selected based on their pattern of consultation (diarrhea or anorexia with or without vomiting). Data were collected from the database during the period going from September 2012 to July 2013.

Results: The overall prevalence of CPV-2 was 32.14% (n=54/168). A total number of 54 young dogs, aging 1 to 7 months, of American Staffordshire terrier, German shepherd, Rottweiler and Spaniel breeds were affected. There was no sex predisposition and German shepherd was the over-represented breed (n=33/54; 61.11%). The prevalence of clinical cases below the three months old was 70.37% (n=38/54) with autumn (n=27/54; 50%) as the most common season of infection. Furthermore, the study showed that 87.04% (n=47/54) of CPV-2 unvaccinated young dogs were positive.

Conclusion: This work was a new descriptive study concerning canine parvovirus infection in the Grand Tunis; further studies are required to better characterize the epidemiology of CPV-2 infection in Tunisia.

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INTRODUCTION

Canine parvovirus type 2 (CPV-2), a member of the *Parvoviridae* family, belonging to the *Protoparvovirus* genus and *Carnivore Protoparvovirus type 1* species emerged in the 1970s as one of the most contagious enteric pathogen of dogs (Decaro and Buonavoglia, 2012; Ortega et al., 2017). It caused a pandemic disease in 1978 (Touihri et al., 2009). The first outbreak occurred in Tunisia in 1999 in the State kennel of Bizerte (Chabchoub et al., 2009).

The canine parvovirus (CPV) infection leads often to death after onset of signs (Parrish, 1995). It can affect dogs of any age and any breed. However, it is mostly common in puppies aged between 6 weeks and 6 months of pure breeds such as German shepherd, Rottweiler and American Staffordshire terrier (Houston et al., 1996). This infection can acquire via faecal-oral route through the contact with infected faeces or contaminated surfaces (Hoelzer et al., 2008). Following incubation period of 3-7 days, the disease can be characterized by an enteric form that comprises fever, anorexia, vomiting, mucoid to hemorrhagic diarrhea (Markovich et al., 2012). Myocarditis, a clinical form, may be seen in neonatal puppies after weeks of infection (Sime et al., 2015). Currently, CPV strain comprises three antigenic variants (2a, 2b and 2c) (Shackelton et al., 2005).

According to the last investigation done in 2009 in Tunisia, all the three variants were circulating with 15 samples of (CPV-2a), 21 samples of (CPV-2b) and 14 samples of (CPV-2c) detected. The distribution of the antigenic CPV-2 variants in the domestic dog population in Tunisia was in favor for CPV-2b (Touihri et al., 2009).

Recently, phylogenetic analyzes have revealed other mutations in the genome of these variants. This change has led to a great biological difference between the initial strain of CPV-2 and its variants, regarding virulence (Wang et al., 2016). Therefore, to reduce the high morbidity and mortality rate in puppies in Tunisia due to CPV-2, a vaccination program was implemented using a titrated parvovirus modified live vaccine (Chabchoub et al., 2009). Although nearly 600 papers have been published on the subject of CPV-2 (Carmichael, 2005), CPV-2 prevalence was analyzed until 2009 in Tunisia. In order to update the data, this study was carried out to provide a new record for CPV-2 prevalence in the Grand Tunis.

MATERIALS AND METHODS

A total of 168 domestic juvenile dogs among 515 juvenile dogs presented to the Department of Medicine and Surgery of pets and horses in the National School of Veterinary Medicine clinic, located in Ariana governorate in Tunisia, were screened in this study. The dogs aged between one and seven months old were selected based on their pattern of consultation (diarrhea or anorexia with or without vomiting) from four governorates of Grand Tunis (Ben Arous, Tunis, Ariana and Manouba). The four governorates are characterized by a semi-arid climate with mild winter and a pluviometry >400 mm/year. In Tunisia, rabies vaccination of domestic juvenile dogs is provided by official campaigns or private veterinarians, and parvovirus vaccine only by private veterinarians. Among the 168 young dogs, 49 and 21 received the rabies vaccine and parvovirus vaccine respectively. The epidemiological data (sex, breed, age, governorate, period, and vaccination status) were collected from the database during the period going from September 2012 to July 2013 as indicator and explanatory variables of parvovirus prevalence. Selection of cases was based on clinical diagnosis supported by history, physical examination, clinical signs and sometimes postmortem findings. In case of suspicion, young dogs were hospitalized in order to detect the onset of the usual recognizable symptoms of CPV-2 infection. Clinical cases with no foul smelling diarrhea or hemorrhagic diarrhea occurring even after 3 days of anorexia have been excluded from the study. The data was then analyzed using Statistical Package for Social Sciences Software (SPSS) version 20.0 and was subjected to *Chi*-square test at confidence level of 95%.
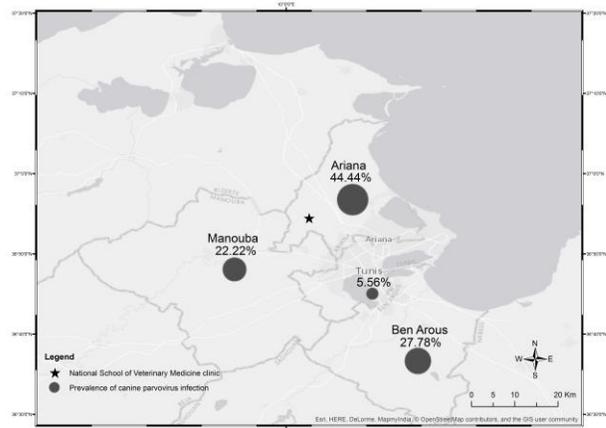

Figure 1. Geographic distribution and prevalence of canine parvovirus infection of clinical cases in the Grand Tunis.

RESULTS

A total of 54 dogs from 168 cases presented with the pattern of consultation diarrhea or anorexia with or without vomiting were confirmed infected with CPV according to clinical diagnosis. There was no sex predisposition recorded in this study. Regarding the breeds, four types were noted: German shepherd, Rottweiler, American Staffordshire terrier and Spaniel. German shepherd recorded the highest percentage with 61.11% (n=33/54) followed by American Staffordshire terrier, Rottweiler and Spaniel with 24.07% (n=13/54), 11.11% (n=6/54) and 3.70% (n=2/54) respectively. No local breeds were confirmed with parvovirus infection in the clinic. The young dogs were divided into two groups: puppies below 3 months old which recorded the highest percentage with 70.37% (n=38/54) and young dogs older than 3 months with 26.63% (n=16/54). Out of the 54 young dogs, 24 were from Ariana, 15 from Ben Arous, 12 from Manouba and 3 from Tunis (**Figure 1**). CPV-2 infection was detected in 50% of the cases presented in autumn (n=27/54), 31.48% (n=17/54) in spring, 11.11% (n=6/54) in winter and 7.41% (n=4/54) in summer (only June and July due to clinic summer break). 47 out of 54 did not receive a parvovirus vaccine (**Table 1**).

DISCUSSION

In the present study, no sex predisposition was apparent which agrees with other results found by Castro et al. (2007), Singh et al. (2013), Nahat et al. (2015) and Ogbu et al. (2016). However, it contrasts results of Umar et al. (2015) and Adejumobi et al. (2017) that reported the susceptibility of females (58.5%) and (52%) respectively which are contrary to the finding of Gombac et al. (2008) and Shima et al. (2015) that recorded a high prevalence in male dogs (83.3%) and (57.8%) respectively. In the other hand, the infection was showed to be more common in German shepherd. This corresponds with the finding of Kumar et al., (2011), Singh et al. (2013), Umar et al. (2015) and Shima et al. (2015). Earlier studies by Adejumobi et al. (2017) and Greene and Decaro (2012) reported a higher risk of infection in Rottweiler. Regarding the age, results highlighted that infection is more common in young dogs aged below three months. This high prevalence was reported by Singh et al. (2013), Cubel Garcia et al. (2014), Ogbu et al. (2016) and Hasan et al. (2017) which could be related to the interference of the immuno- incompetence of the young dog's immune system and the lack of maternal antibodies (Day, 2007). Furthermore, the study showed that the virus is present and circulated in the four governorates. Environmental conditions do not appear to influence the infection. However, the infection prevalence was unequal in the different regions. This therefore could be related to the number of domestic young dogs in each governorate. In 2013, estimated domestic young dogs in Tunis were 10 thousand, 20 thousand in Manouba, 15 thousand in Ben Arous and 16 thousand in Ariana (Rage, 2013). Moreover, a seasonal predisposition was demonstrated

Table 1. Prevalence of CPV-2 infection by sex, breed, age, governorate, period, and vaccination status.

CPV-2 infection				
Sex	Male	59.26% (32/54)	$\chi2=0.9339$ $P=0.333843, >0.05$	Not significant
	Female	40.74% (22/54)		
Breed	G. shepherd	61.11% (33/54)	$\chi2=25.2173$ $P=0 .000014, <0.05$	Significant
	A.S. terrier	24.07% (13/54)		
	Rottweiler	11.11% (6/54)		
	Spaniel	3.70% (2/54)		
Age	1-3 months	70.37% (38/54)	$\chi2=4.6755$ $P=0.030596, <0.05$	Significant
	>3 months	26.63% (16/54)		
Governorate	Ben Arous	27.78% (15/54)	$\chi2=11.8961$ $P=0.007748, <0.05$	Significant
	Tunis	5.56% (3/54)		
	Ariana	44.44% (24/54)		
	Manouba	22.22% (12/54)		
Period	Sept-Oct-Nov	50% (27/54)	$\chi2=16.5385$ $P=0.000879, <0.05$	Significant
	Dec- Jan- Feb	11.11% (6/54)		
	Mar- Apr- Ma	31.48% (17/54)		
	June-July	7.41% (4/54)		
Vaccination status	Vaccinated	12.96% (7/54)	$\chi2=17.1701$ $P=0.000034, <0.05$	Significant

with the highest number of cases occurring in autumn (Sept-Oct-Nov). However, other studies showed a difference in the seasonal distribution. In Nigeria, the disease occurred between November and April (Shima et al., 2015). In Canada, it was between July and September (Nelson and Couto, 1998). Since CPV-2 is a non-enveloped DNA virus, it resists to adverse environmental influences (Sharma et al., 2016). Therefore, the seasonal variation may not be entirely related to climate but also to breeding in dogs (Greene and Decaro, 2012). Regarding vaccination status, the results indicated a high percentage of positive cases in unvaccinated young dogs. Similar results were reported in Singh et al. (2013) and Ogbu et al. (2016). Unvaccinated status is a risk factor to develop CPV-2 infection.

CONCLUSION

Canine parvovirus infection is prevalent in Grand Tunis. Taking adequate measures to prevent contamination is recommended in order to reduce morbidity due to CPV-2 infection.

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CONFLICT OF INTEREST

The authors declare that there is no conflicting interest with regards to the publication of this manuscript.

AUTHORS' CONTRIBUTION

The author collected the data, carried out the research, wrote and revised the manuscript.

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