

Public survey of knowledge concerning canine distemper and protective measures*

Conhecimento da população sobre a cinomose e medidas de proteção

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Abstract

To help understand why there is a prevalence of canine distemper in Brazil, we interviewed 404 owners of dogs that were in clinics or veterinary hospitals about distemper. Our results showed that 80.4% of respondents knew about distemper and 67.6% knew that it is a severe and fatal disease. Approximately 50.9% knew that distemper can be prevented by the use of the vaccine, but 60.9% did not know about distemper vaccines. Our results show that the lack of knowledge and, consequently, the lack of vaccination against distemper may be the most important factors in the endemic presence of distemper in Brazil.

Keywords: canine distemper, control of canine distemper, public knowledge, distemper vaccine.

Resumo

Com a finalidade de entender a prevalência da cinomose canina no Brasil, foram entrevistados 404 proprietários de cães que estiveram em clínica e hospitais veterinários, sobre os diferentes aspectos da cinomose. Os resultados mostraram que 80,4% dos entrevistados conhecem a cinomose e sabem que ela é uma doença grave e fatal (67,6%). Cerca de 50,9% sabem que a cinomose pode ser prevenida com o uso de vacina, mas 60,9% não conhecem a vacina contra a cinomose canina. Os resultados revelam que a falta de informação e conseqüentemente a falta de uso da vacina contra cinomose podem ser os fatores mais importantes para presença endêmica da cinomose em nosso meio.

Palavras-chave: cinomose canina, conhecimento da população, controle de cinomose canina, vacinação contra cinomose.

Introduction

Canine distemper is a disease that is distributed world-wide, is highly contagious, and is fatal in dogs and other species of the Canidae, Mustelidae, Procyonidae, Ursidae, and large Felidae families (Appel, 1969; Appel, 1994; Appel and Summers, 1995; Cleaveland, 2000; Kameo, 2012). The etiological agent, canine distemper virus (CDV), is a negative-sense, single-stranded RNA virus belonging to the genus *Morbillivirus*, family *Paramyxoviridae*. Symptoms can be acute or subacute and manifested as a generalized infection, respiratory disease, hyperkeratotic change, central nervous system disturbance, or combination of these (Deem et al., 2000). In dogs, CDV can cause a fatal disease that manifests as pyrexia, anorexia, nasal discharge, conjunctivitis, diarrhea, leukopenia, and encephalitis (Appel, 1969; Appel, 1994; Appel e Summers, 1995; Deem et al., 2000).

Distemper was one of the most common fatal diseases in dogs worldwide. With the emergence of specific vaccines, distemper has become rare in countries that adopt strict vaccination regimens. However, mortality is still very common in non-vaccinated animals or in cases of vaccine failure (Greene et al., 2001, Greene e Vandeveld, 2012).

Distemper is an endemic disease in Brazil, and thousands of dogs die every year due to CDV infection (Headley e Graça, 2000; Del Puerto et al., 2010). The prevalence of distemper in Brazil has been described as ranging from 7.1 to 58.3% (Hass et al., 2008; Sonne et al., 2009). In an epidemiological study on the life expectancy of pet dogs, we demonstrated that infectious diseases - especially distemper - are the main causes of early death in dogs (Bentubo et al., 2007). These data were supported by Figuera et al. (2008) who found that CDV infection was the main cause of natural death and euthanasia of dogs in southern Brazil.

However, the lack of epidemiological studies and, consequently, information on the occurrence of this infection has hampered the adoption of more efficient methods to control this disease. Thus, distemper begins to be seen as an emerging disease, and a better understanding becomes necessary for the improvement of measures to prevent the advance of this disease in domestic and wild canine populations (Povey, 1986). To understand more of the epidemiological factors involved in the notable prevalence of distemper in our country, a questionnaire was administered to assess the level of knowledge that the population of São Paulo has on different aspects of distemper.

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Materials and methods

The study design was cross-sectional, with administration of the survey to dog owners living in the city of São Paulo, Brazil. To calculate the sample size, we considered that 50% of the population would have no prior knowledge about distemper and adopted a confidence level of 95% (Lwanga and Lemeshow, 2011). We interviewed 404 individuals who were randomly selected from those who had one or more dogs and who visited clinics, pet shops, veterinary hospitals, and other veterinary establishments in São Paulo.

The study was conducted during the period from March to November 2012. Participants read and signed a consent form. The researchers administered a questionnaire that had pre-selected questions about different aspects of distemper (Table 1). The questionnaire was administered in Portuguese by a research assistant in a "face-to-face" interview. Demographic information, including the age and gender of all study participants, was tabulated and analyzed. The participants could only choose one answer available in the questionnaire. The study sample was made up of 51.8% (209/404) women and 48.2% (195/404) men, and the age of the participants ranged from 22 years to 68 years. The study protocol was approved by the Paulista University Research Ethics Board for Health Sciences Research (142/2010).

Non-parametric and parametric data were compared using Wilcoxon's rank-sum test and Student's t-test, respectively. For all statistical analyses, findings with $p \leq 0.05$ are considered statistically significant. Statistical calculations were performed using the Statistical Package for the Social Sciences (SPSS 18.0; SPSS, Chicago, Illinois).

Results and discussion

This research showed that 80.4% (325/404, $p = 0.033$) of the sampled population knew about distemper disease, while 19.6% (79/404) had never heard of the disease (Table 1). We observed that the majority of those surveyed (67.6%, 273/404, $p = 0.041$) knew that distemper affects dogs and can cause death of sick dogs. Among individuals who had knowledge about the disease, 60.6% (197/325, $p = 0.045$) received information from veterinarians, 19.1% (62/325) learned from television programs, and 20.3% (66/325) learned from other media.

Approximately half of the respondents (50.9%, 206/404, $p = 0.055$) knew that the vaccine is the most effective way of preventing the disease, and this result was not statistically significant. Meanwhile, 14.1% (57/404) of the respondents believed that preventing their dog from wandering the streets is the best way to avoid infection. However, 60.9% (246/404, $p = 0.045$) of those surveyed said they did not know that there is an available distemper vaccine for the prevention of the disease. In addition to vaccination, a critical step in preventing distemper is the adoption of a strong sanitation program. This requires that owners and veterinarians adopt measures to prevent the spread of CDV from an infected dog to a susceptible dog. Measures such as the isolation of sick dogs and the decontamination of the environment, clothing, equipment, hands, and surfaces should be systematically performed (Greene e Vandeveld, 2012). This study revealed a lack of knowledge about vaccination and other methods of prevention, which were cited by fewer respondents.

A significant number of respondents (298/404, 73.8%, $p = 0.039$) reported they did not use the vaccine against distemper. Most of the respondents (78.9%, 319/404, $p = 0.037$) attributed this

to a lack of knowledge about the vaccine. Only a small group of owners did not vaccinate their dogs because of the cost of the vaccine (8.7%, 35/404), and a small number considered it difficult to take the animal to get vaccinated (7.2%, 29/404) or believed a lack of contact with other animals was sufficient to prevent the transmission of distemper (5.2%, 21/404).

This is the first study showing that distemper and its potential severity is largely known by the dog-owning population of São Paulo. Based on the premise that the control and eradication of infectious disease depends on public knowledge, it is important to know that most of the public knows the severity of distemper in dogs. This is especially important when control measures involve the active participation of these individuals (Horzinek, 2006).

The most effective measures to control distemper are immunization by vaccination and the adoption of classical hygiene practices (Greene e Vandeveld, 2012). The prevalence of canine distemper is low wherever vaccination regimens are practiced (Greene e Vandeveld, 2012). Active immunization against distemper can be achieved by the systematic use of existing vaccines, has been employed since 1923 (Povey, 1986; Chappius, 1995; Greene et al., 2001) and has been used to control the disease in several countries in Europe, Asia, and North America. In addition, CDV is extremely susceptible to common disinfectants.

Our results show that approximately only half of those surveyed knew that immunization is the most effective way to control the disease. Furthermore, 60.9% of those surveyed did not know that there is a vaccine commercially available against distemper, and many respondents did not know that distemper vaccine is included in the multiple vaccines available in the domestic market.

Among the interviewed owners, 12.4% (50/404) revealed that their dog had distemper. Of these owners, 50% (25/50) had their dog undergo drug treatment, 38% (19/50) had their dog euthanized, 4% (2/50) did not take their dog to the vet, and 8% (4/50) did not remember what was done. The cost of therapy associated with clinical distemper in Brazil was estimated to be between R\$ 258.3 million/annum (USD 147.6 million/annum) and R\$ 280.5 million/annum (USD 160.3 million/annum) (Headley et al., 2012). The age range of the affected animals was 1 month to 12 months and was consistent with the results observed by others (Headley e Graça, 2000; Sonne et al., 2009).

Though the majority of the interviewed owners knew about distemper, few (21.3%, 86/404) demonstrated knowledge about its clinical presentations and answered that motor symptoms, such as walking difficulties, are the most common. Among those who had this information, it was noted that few people (12.4%) knew about the transmission of the disease. Transmission was partly attributed to contact with animals with distemper (28.7%) and partly to transmission by air (14.4%). The recognition of clinical disease is a major factor in instituting early prophylaxis and prevention, especially if the animals live collectively or are allowed outside (Greene e Vandeveld, 2012).

Key aspects for the control of CDV and for minimizing its threat to domestic dogs and wildlife should include the identification of infection reservoirs, of the mechanisms by which infections are sustained within reservoirs, and of the sources and routes of transmission from reservoirs to species of concern (Martella et al., 2008). Domestic dogs are one of the most numerous carnivores in the world (Daniels e Bekoff, 1989; Acosta-Jamett et al., 2011), and they are particularly abundant in urban and rural areas of some developing countries. They can be excellent

reservoirs for pathogens because they usually live in large populations, are often not vaccinated, and are regularly allowed to roam freely, thus facilitating contact between infected and susceptible hosts (WHO/WSPA, 1990). Vaccine coverage of 95% of domesticated dogs would be needed to control canine distemper in pets (Chappius, 1995).

We believe that one of the best ways to spread knowledge about distemper is through veterinarians, because it was found that veterinarians were mainly responsible for the knowledge that respondents had about the disease. Because there is a fluctuation in the temporal occurrence of the disease (Horzinek, 2006), control and educational programs should adapt to this condition. Tools such as our knowledge survey may be an initial starting point for public knowledge assessments or may be used to monitor responses to an existing educational program.

References

- ACOSTA-JAMETT, G.; CHALMERS, W.S.; CUNNINGHAM, A.A.; CLEAVELAND, S.; HANDEL, I.G.; BRONSVOOR, B.M.C. Urban domestic dog populations as a source of canine distemper virus for wild carnivores in the Coquimbo region of Chile. *Veterinary Microbiology*, v. 152, p. 247-257, 2011.
- APPEL, M.J. Pathogenesis of canine distemper. *American Journal of Veterinary Research*, v. 30, p.1167-1182, 1969.
- APPEL, M.J.; YATES, R.A.; FOLEY, G.L.; BERNSTEIN, J.J.; SANTINELLI, S.; SPELMAN, L.H.; MILLER, L.D.; ARP, L.H.; ANDERSON, M.; BARR, M. Canine distemper epizootic in lions, tigers, and leopards in North America. *Journal of Veterinary Diagnostic Investigation*, v. 6, p. 277-288, 1994.
- APPEL, M.J.; SUMMERS, B.A. Pathogenicity of morbilliviruses for terrestrial carnivores. *Veterinary Microbiology*, v. 44, p.187-191, 1995.
- BENTUBO, H.D.L.; TOMAZ, M.A.; BONDAN, E.F.; LALLO, M.A. Expectativa de vida e causas de morte em cães na área metropolitana de São Paulo (Brasil). *Ciência Rural*, v. 37, p.1021-1026, 2007.
- CHAPPUIS, G. Control of canine distemper. *Veterinary Microbiology*, v. 44, p. 351-358, 1995.
- CLEAVELAND, S.; APPEL, M.G.J.; CHALMERS, W.S.K.; CHILLINGWORTH, C.; KAARE, M.; DYE, C. Serological and demographic evidence for domestic dogs as a source of canine distemper virus infection for Serengeti wildlife. *Veterinary Microbiology*, v.72, p. 217-227, 2000.
- CLEAVELAND, S.; KAARE, M.; KNOBEL, D.; LAURENSEN, M.K. Canine vaccination-providing broader benefits for disease control. *Veterinary Microbiology*, v.117, p. 43-50, 2006.
- DANIELS, T.J.; BEKOFF, M. Population and social biology of free-ranging dogs, *Canis familiaris*. *Journal of Mammalogy*, v. 70, p.754-762, 1989.
- DEL PUERTO, H.L.; VASCONCELOS, A.C.; MORO, L.; ALVES, F.; BRAZ, G.F.; MARTIN, A.S. Canine distemper virus detection in asymptomatic and non vaccinated dogs. *Pesquisa Veterinária Brasileira*, v. 30, p. 132-138, 2010.
- DEEM, S.L.; SPELMAN, L.H.; YATES, R.A.; MONTALI, R.J. Canine distemper in terrestrial carnivores: a review. *Journal of Zoo and Wildlife Medicine*, v. 31, p. 441-451, 2000.
- FIGHERA, R.A.; SOUZA, T.M.; SILVA, M.C.; BRUM, J.C.; GRAÇA, D.G.; KOMMERS, G.D.; IRIGOYEN, L.F.; BARROS, C.S.L. Causas de morte e razões para eutanásia de cães da Mesorregião do Centro Ocidental Rio-Grandense (1965-2004). *Pesquisa Veterinária Brasileira*, v. 28, p. 223-230, 2008.
- In Brazil, many studies have been conducted to understand the epidemiology, pathology, and treatment of canine distemper, but this is the first study that addresses the level of knowledge and understanding of the disease among dog owners. The results of our study show that the dog owners recognized the need to vaccinate pets but were unaware of vaccine availability. We suggest greater dissemination of information through advertising campaigns and through veterinarians about the vaccine and its use. It is likely that this is the most sensitive point of the control program against canine distemper, because many respondents said they did not vaccinate their animals against distemper because they did not know that a vaccine was available. We believe that this information can assist the conduct of veterinarians, governments, producers of vaccines against distemper, and those interested in controlling this disease.
- GREENE, C.E.; SCHULTZ, R.D.; FORD, R.B. Canine vaccination. *Veterinary Clinics of North America: Small Animal Practice*, v. 31, p. 473-492, 2001.
- GREENE, C.E.; VANDELVELDE, M. C. *Canine distemper*. In: GREENE, C.E. (Ed.) Infectious diseases of the dog and cat. 4. ed. St Louis: Elsevier, 2012, p. 25-42.
- HASS, R.; JOHANN, J. M.; CAETANO, C. F.; FISCHER, G.; VARGAS, G. D.; VIDOR, T.; HÜBNER, S. O. Níveis de anticorpos contra o vírus da cinomose canina e o parvovírus canino em cães não vacinados e vacinados. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, v. 60, p. 270-274, 2008.
- HEADLEY, S.A.; GRAÇA, D.L. Canine distemper: epidemiological findings of 250 cases. *Brazilian Journal of Veterinary Research and Animal Science*, v. 37, p.136-140, 2000.
- HEADLEY, S.A.; AMUDE, A.M.; ALFIERI, A.F.; BRACARENSE, A.P.F.R.L.; ALFIERI, A.A. Epidemiological features and the neuropathological manifestations of canine distemper virus-induced infections in Brazil: a review. *Semina: Ciências Agrárias*, v. 33, n. 5, p. 1945-1978, 2012.
- HORZINEK, M.C. Vaccine use and disease prevalence in dogs and cats. *Veterinary Microbiology*, v.117, p. 2-8, 2006.
- LWANGA, A.K.; LEMESHOW, S. Sample size determination in health studies. [http://whqlibdoc.who.int/publications/9241544058_\(p23-p80\).pdf](http://whqlibdoc.who.int/publications/9241544058_(p23-p80).pdf). (Acesso em 12 de dezembro de 2011).
- KAMEO, Y.; NAGAO, Y.; NISHIO, Y.; SHIMODA, H.; NAKANO, H.; SUZUKI, K.; UNE, Y.; SATO, H.; SHIMOJIMA, M.; MAEDA, K. Epizootic canine distemper virus infection among wild mammals. *Veterinary Microbiology*, v. 154, p. 222-229, 2012.
- MARTELLA, V.; ELIA, G.; BUONAVOGLIA, C. Canine distemper virus. *Veterinary Clinics of North America: Small Animal Practice*, v. 38, p. 787-797, 2008.
- POVEY, R.C. Distemper vaccination of dogs: factors which could cause vaccine failure. *The Canadian Veterinary Journal*, v. 27, p. 321-323, 1986.
- SILVA, M. C.; FIGHERA, R. A.; BRUM, J. S.; GRAÇA, D. L.; KOMMERS, G. D.; IRIGOYEN, L. F.; BARROS, C. S. L. Aspectos clinicopatológicos de 620 casos neurológicos de cinomose em cães: Clinicopathological features in 620 neurological cases of canine distemper. *Pesquisa Veterinária Brasileira*, v. 27, n. 5, p. 215-220, 2007.
- SONNE, L.; OLIVEIRA, E. C.; PESCADOR, C. A.; SANTOS, A. S.; PAVARINI, S. P.; CARISSIMI, A. S.; DREIMEIER, D. Achados patológicos e imuno-histoquímicos em cães infectados naturalmente pelo vírus da cinomose canina. *Pesquisa Veterinária Brasileira*, v. 29, p. 143-149, 2009.
- WHO/WSPA Guidelines for Dog Population Management. WHO, Geneva, 1990.