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Study on canine respiratory disease and evaluating the effect of treatment at the Animal Clinic, Can Tho University

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ABSTRACT

The research was carried out to investigate the clinical diagnosis in dogs with respiratory tract disease and evaluate the treatment effect in the Animal Clinic of Can Tho University. The determination of respiratory tract disease in dogs was performed by cross-sectional study in 736 dogs reared in Can Tho city. The results showed that 143 out of 736 (19.43%) dogs had signs of respiratory tract disease by the clinical diagnosis. In addition, the respiratory tract disease in dogs was dependent on and gradually increased according to age of dogs (P<0.05); however, it was regardless of sex (P>0.05). The results indicated that dogs had the clinical diagnosis in the upper airways (79.72%) and lower airways (20.28%). Cough combined nasal discharge at the highest rate (18.18%), followed by cough combined nasal discharge and eye rheum (13.99%), increase of respiratory rhythm (13.29%), cough combined nasal discharge and increase of respiratory rhythm (10.49%), nasal discharge combined eye rheum (10.49%), cough combined nasal discharge and rales (9.79%), cough combined rales and depression (6.99%), dry cough (6.29%), cough combined increase of respiratory rhythm and depression (5.59%), nosebleed (2.80%) and nosebleed combined increase of respiratory rhythm (2.10%). The effectiveness of the treatment using Marbofloxacin or Cefuroxime was similar, and the adjustment for base clinical signs of the respiratory tract disease was high or rich in both treatments.

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1 INTRODUCTION

Dog is one of the most dominant pets in Vietnam, as dog is friendly, faithful and useful. According to the Vietnamese, dog is an important pet, local dog is a house guard and has a significant contribution to human life. In recent years, species and number of dogs have increased considerably in Vietnam because of increasing human requirements. Foreign dogs are popularly raised in Vietnam due to a good adaptation to the local climate and feeds. However, dogs nursing is remained a disease challenge and care labeling. Canine respiratory tract disease was considered a common disease syndrome of limited clinical significance. Clinical signs such as cough, nasal discharge and dyspnea are now rarely associated with a single pathogen and more often attributed to multiple agents that sequentially or synergistically cause disease (Priestnall *et al.*, 2014). An important step in the pathogenesis of canine respiratory tract disease involves the colonization of primary respiratory pathogens at the upper airway mucosa. In the susceptible host and the proper environment, these primary respiratory

pathogens are capable of bypassing the mechanical barriers, evading the innate immune response and disrupting mucociliary clearance, thereby allowing both primary and secondary bacterial and viral pathogens to colonize and infect the upper and lower respiratory tract. Many factors contribute to the aetiology of canine respiratory tract disease including viruses and bacteria as well as stress due to mixing and housing in an unfamiliar environment (Erles and Brownlie, 2005). The increase of respiratory tract disease of dogs may seriously influence the dog health. Management as well as early diagnosis of respiratory tract disease in dogs which has an important role in preventing severe complications is necessary for veterinary's work. The main objective of this research was to investigate the clinical diagnosis of canine respiratory tract disease and evaluate the treatment effect of the Animal Clinic of Can Tho University.

2 MATERIALS AND METHODS

2.1 Time and location

This study was conducted in the Animal Clinic, College of Agriculture - Can Tho University, Can Tho City, Vietnam. The implementation of this study was from June to October 2018.

2.2 Animals

Experimental animals were all dogs that infected with respiratory tract disease with typical clinical and atypical clinical manifestations regardless age-, breeds- and sex.

2.3 Equipment and drugs

The equipment such as stethoscope, thermometer and syringe were used in this study, and two currently available antibiotics in the Animal Clinic (Marbofloxacin (10%), Cefuroxime (1 g)) were used to control respiratory tract disease in dogs.

2.4 Methods

2.4.1 Research methods

The clinical diagnosis was used to check the level of respiratory tract disease in dogs. The standard of diagnosis is according to Nguyen Duong Bao (2005) and Pham Ngoc Thach (2008).

2.4.2 Recorded parameters

The rate of dogs with respiratory tract disease on age, breed, sex and rearing modality dependence; the typical clinical and atypical clinical manifestations and evaluation of treatment effect were recorded.

2.4.3 Survey design

The standard for choosing the subjects is dogs with respiratory tract disease, permission and collaboration of owners. The survey design of experiment was presented in Table 1.

Table 1: Layout of experiment

Items	No. (dog)	Medicine
Mar	30	Marbofloxacin with a dose of 1.0 ml/50 kgBW (SC), 1 time/day
Cef	30	Cefuroxime with a dose of 1.0 ml/10 kgBW (SC), 1 time/day

SC: Subcutaneous injection; BW: Body weight

2.4.4 Evaluation of treatment effect

Evaluation of treatment effect was presented in Table 2.

Table 2: Evaluation of treatment effect

Level	Clinical symptom
Good control	No symptoms (no clinical manifestations)
Bad control	Not decreased or died

2.5 Statistical analysis

Mean and standard deviation were calculated using Microsoft Excel version 2016. The data were analyzed by Chi-square of Minitab Statistical Software version 16.0 at the significant level of 5%.

3 RESULTS AND DISCUSSION

3.1 The prevalence of respiratory tract disease in dogs

The study sampling frame comprised 736 dogs attending Animal Clinic. Result on ratio of respiratory tract disease in dogs by random survey in the Animal Clinic of Can Tho University was presented in Table 3.

Table 3: The rate of respiratory tract disease in dogs

No. of examined (dog)	No. of respiratory tract disease (dog)		Items			
			Upper airways		Lower airways	
No.	No.	Percentage (%)	No.	Percentage (%)	No.	Percentage (%)
736	143	19.43	114	79.72	29	20.28

Table 3 showed that the rate of respiratory tract disease in dogs by random survey in the Animal Clinic of Can Tho University was 19.43%. This result was higher than study of Ly Thi Lien Khai (2017), who observed that ratio of respiratory disease in dogs in Can Tho city was 10.49%. The respiratory system consists of the large and small airways and the lungs. When a dog breathes air in through its nose or mouth, the air travels down the trachea, which divides into the tubes known as the right and left bronchi then into the smaller airways called bronchioles in the lungs. The bronchioles end in the small sacs called alveoli (King, 2004; Pham Ngoc Thach, 2008). A varying flora of indigenous commensal organisms (including *Pasteurella multocida, Bordetella bronchiseptica, Streptococci, Staphylococci, Pseudomonas* and *Coliform* bacteria) normally resides in the canine nasal passages, nasopharynx, upper trachea and at least intermittently in the lungs, without causing clinical signs (Kuehn, 1990; Russell *et al.*, 1991; Lappin *et al.*, 2017). Opportunistic infections by these bacteria may occur when respiratory defense mechanisms are compromised by infection with a primary pathogen. Secondary bacterial infections complicate the management of viral respiratory infections of dogs. Pathogens may continue to reside in the respiratory tract of convalescent animals. When stressed, these animals may relapse; they can also act as a source of infection for others. Poor management practices are often associated with poor hygienic and environmental conditions, and the resultant stress increases both the incidence and severity of infections (Kuehn, 1990; Russell *et al.*, 1991; King, 2004).

3.1.1 The prevalence of respiratory tract disease in dogs by ages

Result on respiratory tract disease in dogs by ages was presented in Table 4.

Table 4: The rate of respiratory tract disease in dogs by ages

Age groups	No. of examined (dog)	No. of disease (dog)	Percentage (%)
I (<6 months)	227	39	17.18[a]
II (6 months - 2 years)	173	29	16.76[a]
III (>2 years - 5 years)	175	30	17.14[a]
IV (>5 years)	161	45	27.95[b]
Total	736	143	19.43

[a, b]: Means with different letters in the same column are significantly different (P<0.05)

As shown in Table 4, the rate of respiratory tract disease in dogs by ages was significantly different (P<0.05). The group of over 5 years of age had the highest rate (27.95%), followed by group I (<6 months) (17.18%), group III (>2 years - 5 years) (17.14%) and the lowest rate was found in group II (6 months - 2 years) (16.76%). This result is consistent with Kuehn (1990) and King (2004) that respiratory diseases are common in dogs. Although clinical signs such as coughing and dyspnea are commonly referable to primary problems of the respiratory tract, they may also occur secondary to disorders of other organ systems. Both young and aged animals are at increased risk of developing respiratory disease. At birth, the respiratory and immune systems are incompletely developed; this facilitates the introduction and spread of pathogens within the lungs, and alveolar flooding may occur. In aged animals, chronic degenerative changes that disrupt normal mucociliary clearance and immunological anergy may render the lungs more vulnerable to airborne pathogens and toxic particulates (Kuehn, 1990; King, 2004). Age-related differences should be considered when using the clinical diagnosis in dogs with respiratory tract disease.

3.1.2 The prevalence of respiratory tract disease in dogs by breeds

Result on respiratory tract disease in dogs by breeds was presented in Table 5.

Table 5: The rate of respiratory tract disease in dogs by breeds

Breed groups	No. of examined (dog)	No. of disease (dog)	Percentage (%)
Domestic	346	54	15.61[a]
Foreign	390	89	22.82[b]
Total	736	143	19.43

[a, b]: Means with different letters in the same column are significantly different (P<0.05)

Table 5 showed that the rate of respiratory tract disease in dogs by breeds was significantly different (P<0.05). The ratio of respiratory tract disease in foreign dogs breeds (22.82%) was significantly higher (P<0.05) than that in domestic dog breeds (15.61%). Similar results were verified by Ly Thi

Lien Khai (2017) that who observed that this rate in foreign dog breeds was higher than domestic dog breeds with 12.75% and 7.99%, respectively (P<0.05). Foreign dog breeds are increasingly common, but canine disease has been associated with increased respiratory tract disorders. Predisposition to respiratory tract disorders including stenotic nares, enlarged tonsils, elongated soft palate, everted lateral saccules of the larynx and collapse of the larynx have been reported in foreign dog breeds. Individual dogs may have one or a combination of such respiratory tract conditions which can additionally predispose to other respiratory tract disorders and can be variously combined to describe an overall brachycephalic obstructive airway syndrome (O'Neill *et al.*, 2015). O'Neill *et al.* (2015) observed that upper respiratory tract disorders are relatively commonly diagnosed across Bulldog, French Bulldog, Pug, Border Terrier and Yorkshire Terrier dogs in England. The three evaluated breed types of respiratory tract conformation (Bulldog, French Bulldog and Pug) were relatively short-lived and predisposed to respiratory tract disorders. Breed-related differences should be considered when using the clinical diagnosis in dogs with respiratory tract disease.

3.1.3 The prevalence of respiratory tract disease in dogs by sex

Result on respiratory tract disease in dogs by sex was presented in Table 6.

Table 6: The rate of respiratory tract disease in dogs by sex

Gender groups	No. of examined (dog)	No. of disease (dog)	Percentage (%)
Male	387	82	21.19
Female	349	61	17.48
Total	736	143	19.43

Table 6 showed that the rate of respiratory tract disease in dogs by male sex (21.19%) was higher compared to female sex (17.48%). However, there was no difference (P>0.05) on respiratory tract disease in dogs by sex. A variety of bacteria normally lives in the canine nasal passages, throat, trachea and sometimes lungs without causing signs of illness. Infections by these usually harmless bacteria may occur when the respiratory defense mechanisms are weakened by another infection, irritant or disease. Disease organisms may continue to live in the respiratory tract of recovering animals. When stressed, these animals may relapse; they can also act as a source of infection for other animals. Poor management practices (such as overcrowding) are often associated with poor sanitation and environmental conditions, which can lead to more frequent and more severe infections (Kuehn, 1990; Russell *et al.*, 1991; King, 2004). Similarly, Ly Thi Lien Khai (2017) suggested that the rate of respiratory tract disease in dogs based on gender was no difference (P>0.05).

3.1.4 The prevalence of respiratory tract disease in dogs by rearing modality

Result on respiratory tract disease in dogs by rearing modality was presented in Table 7.

Table 7: The rate of respiratory tract disease in dogs by rearing modality

Rearing modality	No. of examined (dog)	No. of disease (dog)	Percentage (%)
Captive	438	70	15.98[a]
Kept free	298	73	24.50[b]
Total	736	143	19.43

[a, b]: Means with different letters in the same column are significantly different (P<0.05)

As shown in Table 7, the rate of respiratory tract disease of dogs in the free kept groups was significantly different (P<0.05) compared to that with captive group. According to Kuehn (1990) and King (2004), showed that the most important function of the respiratory system is to deliver oxygen into the blood, which distributes it throughout the body and to remove carbon dioxide from the blood. The exchange of oxygen and carbon dioxide occurs in the alveoli. When this exchange fails or becomes inefficient because of disease, the animal can become seriously ill. Large airborne particles usually land on the mucous lining of the nasal passages, larynx, trachea, and bronchi, after which they are carried to the throat to be either swallowed or coughed up. Small particles and microorganisms are destroyed by the body's immune system. In the dogs with kept free group, lung and airway disorders are often caused by direct infection with viruses, bacteria, fungi, parasites, inhalation of irritants or toxic substances. Similar results were verified by Ly Thi Lien Khai (2017) that the rate of respiratory tract disease in dogs based on kept free (13.12%) was higher compared to captive (9.62%), this difference was statistically significant (P<0.05).

3.1.5 The popular clinical symptoms of respiratory tract disease in dogs

Result on the popular clinical symptoms of respiratory tract disease in dogs was presented in Table 8.

Table 8 showed that the rate of popular clinical symptoms of respiratory tract disease in dogs: cough combined nasal discharge at the highest rate (18.18%), followed by cough combined nasal discharge and eye rheum (13.99%), increase of respiratory rhythm (13.29%), cough combined nasal discharge and increase of respiratory rhythm (10.49%), nasal discharge combined eye rheum (10.49%), cough combined nasal discharge and rales (9.79%), cough combined rales and depression (6.99%), dry cough (6.29%), cough combined increase of respiratory rhythm and depression (5.59%), nosebleed (2.80%) and nosebleed combined increase of respiratory rhythm (2.10%). The result shows that the typical clinical manifestations of respiratory tract disease in dogs such as cough, nasal discharge and increase of respiratory rhythm, etc. Lappin *et al.* (2017) stated that upper respiratory tract disease is a syndrome consisting of clinical signs that can include serous to mucopurulent ocular and nasal discharges, epistaxis, sneezing, and conjunctivitis. Pham Ngoc Thach (2008) also reported that the classic signs of canine respiratory tract infection are very similar to the symptoms of the common cold in people. The symptoms of clinical disease in domestic dogs will depend upon the underlying cause of the condition. Dogs with respiratory tract infections typically develop one or more of the following symptoms: sneezing, snorting, coughing (deep, dry and hacking or moist and productive), nasal irritation, nasal discharge, fever (low-grade), difficulty breathing (dyspnea), tiredness, loss of appetite (inappetence), weight loss. Pham Ngoc Thach *et al.* (2012) and Ly Thi Lien Khai (2017) shared the similar results that the typical clinical manifestations of respiratory tract disease in dogs including increase of respiratory rhythm, cough, nasal discharge, dyspnea, rales and depression, etc.

Table 8: The rate of popular clinical symptoms

Clinical symptom	No. (dog)	Percentage (%)
Cough + Nasal discharge	26	18.18
Cough + Nasal discharge + Eye rheum	20	13.99
Increase of respiratory rhythm	19	13.29
Cough + Nasal discharge + Increase of respiratory rhythm	15	10.49
Nasal discharge + Eye rheum	15	10.49
Cough + Nasal discharge + Rales	14	9.79
Cough + Rales + Depression	10	6.99
Dry cough	9	6.29
Cough + Increase of respiratory rhythm + Depression	8	5.59
Nosebleed	4	2.80
Nosebleed + Increase of respiratory rhythm	3	2.10
Total	143	100.00

3.2 Results of the effect of treatments

After 5-7 days of treatment in respiratory tract disease by using antibiotics, most of the clinical symptoms decreased by times. Result on the effect of treatments in respiratory tract disease in dogs was presented in Table 9.

Table 9: The effect of treatments in respiratory tract disease in dogs

Items	Upper airways					Lower airways				
	No. (dog)	Good control		Bad control		No. (dog)	Good control		Bad control	
		No.	(%)	No.	(%)		No.	(%)	No.	(%)
Cef	20	18	90.00	2	10.00	10	9	90.00	1	10.00
Mar	20	19	95.00	1	5.00	10	9	90.00	1	10.00

Cef: Cefuroxime; Mar: Marbofloxacin

The results in Table 9 indicated that treatment by using Marbofloxacin had the good control of upper airways (95.00%) higher compared to Cefuroxime (90.00%); treatment by using Marbofloxacin or Cefuroxime had the same rate in good control of lower airways (90.00%). Marbofloxacin is a synthetic, bactericidal antimicrobial, belonging to the fluoroquinolone group which acts by inhibition of DNA. Marbofloxacin is effective against a wide range of Gram-positive bacteria (in particular *Staphylococci,*

Streptococci) and Gram-negative bacteria (*Escherichia coli, Salmonella typhimurium, Klebsiella spp, Shigella spp, Pasteurella spp, Haemophilus spp, Pseudomonas spp, Brucella canis, Mycoplasma spp)*. Cefuroxime is in a class of medications called cephalosporin antibiotics that works by killing bacteria. Cefuroxime injection is used to treat certain infections caused by bacteria including pneumonia and other lower respiratory tract infections; meningitis and urinary tract infections (Vo Thi Tra An, 2014). Marbofloxacin and Cefuroxime were found as the effective antibiotics for treating respiratory tract disease in dogs. However, the treatment by using Cefuroxime had the bad control of upper airways (10.00%) higher compared to Marbofloxacin (5.00%); using Marbofloxacin and Cefuroxime had the same rate of treatment in the bad control of lower airways (10.00%). The reason is because the owners do not take care of dogs properly, dogs are not kept warm, respiratory tract disease change from chronic to acute respiratory infections.

4 CONCLUSION AND SUGGESTION

The rate of respiratory tract disease in dogs are 19.43% in the Animal Clinic of Can Tho University. The percentage of respiratory tract disease varies among ages, breeds and rearing modality. Foreign dog breeds are more prone to respiratory tract disease than domestic dog breeds. Dogs of over 5 years of age have the highest risk of respiratory tract disease (27.95%). Clinical symptoms include cough, nasal discharge, increase of respiratory rhythm, rales, etc. Marbofloxacin or Cefuroxime could control clinical symptoms in respiratory tract disease in dogs.

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