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Antimicrobial sensitivity of most commonly isolated bacteria from feline upper respiratory infection

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ABSTRACT: In cats, upper respiratory tract infection (URI) can be associated with primary or secondary bacterial infection and is generally treated with antimicrobials. Antimicrobial use can be inappropriate, and overuse. There are no detailed protocols for treatment, such as those available for human treatment. This study aimed to determine the antimicrobial sensitivity of the most isolated bacteria in cats that infected with the URI. Isolation and identification of bacteria in samples of cats infected with the URI were then continued with the antibiotic sensitivity test for amoxicillin, doxycycline, tetracycline, azithromycin, ciprofloxacin, and cefotaxime using the Kirby Bauer Agar Disc diffusion method. Based on the research results, the bacteria identified were *Enterobacter* spp., *Streptococcus* spp., *Staphylococcus* spp., *Pseudomonas* spp., *Serratia* spp., *Yersinia* spp., *Micrococcus* spp., *Klebsiella* spp., and *Hafnia* spp. Amoxicillin antibiotic resistance was found in four isolates of *Staphylococcus* spp. and two isolates resistant to cefotaxime. Amoxicillin and tetracycline antibiotic resistance were found in one isolate of *Streptococcus* spp., two isolates resistant to cefotaxime and two intermediate isolates to doxycycline. One isolate of *Enterobacter* spp. was resistant to amoxicillin, azithromycin and two isolates were resistant to cefotaxime. All tested isolates were sensitive to ciprofloxacin. Based on the antibiotic sensitivity test, most isolates were sensitive, but there were isolates resistant to antibiotics, especially amoxicillin and cefotaxime.

Keywords:
antibiotics resistant, bacteria, cat, upper respiratory tract infection.

■ INTRODUCTION

Respiratory infection are commonly found in cats presented to veterinary practices. Infection can occur in the upper- (URI) and lower respiratory tract (LRI). The isolated bacteria in feline URI are *Pasteurella* spp., *Streptococcus* spp., *Staphylococcus* spp., *Bordetella* spp., and *Escherichia coli*. The use of antibiotics in the treatment of bacterial infections should be based on standards of clinical effectiveness, low toxicity and the least possible impact on the multi-resistant bacteria. Balancing the need for successful therapy and minimizing growth and dissemination of antimicrobial resistance in animals and human's bacteria (Weese *et al.* 2015). This study aimed to determine the antimicrobial sensitivity of the most isolated bacteria in cats that infected with the URI.

■ MATERIAL AND METHODS

Materials used in this study were samples from the nasal cavity of the cat with respiratory disease, medium for isolation and identification of bacteria, and antibiotic disc for amoxicillin, doxycycline, tetracycline, azithromycin, ciprofloxacin, and cefotaxime. Antibiotic sensitivity test were carried out using Kirby Bauer Agar Disc diffusion method. Interpretation data with Clinical Laboratory Standards Institute 2018 and few in Andrew (2009), Barry & Fuchs (1996), ADICQC (2017), and Direct (2015).

■ RESULTS AND DISCUSSION

Staphylococcus spp., *Streptococcus* spp., and *Enterobacter* spp, are the most isolated bacteria from feline upper respiratory infection (URI), hence only these three bacteria were used to performed the antimicrobial test. Tabel 1 & 2 shows antimicrobial sensitivity test of most commonly bacteria.

Table 1. Antimicrobial sensitivity test.

Code	Bacteria	Average diameter of inhibition zone (mm)					
		Amx		Azi		Dox	
1.2	*S. epid*	26.0	R	31.5	S	22.5	S
6.2	*S. aureus*	13.0	R	24.5	S	27.5	S
7.1	*S. aureus*	6.0	R	18.5	S	25.5	S
7.2	*S. aureus*	39.0	S	25.0	S	33.5	S
7.4	*S. aureus*	9.0	R	15.5	S	28.0	S
2.1	*Strep spp.*	30.0	S	29.5	S	28.0	S
3.3	*Strep spp.*	40.0	S	23.5	S	27.5	I
5.1	*Strep spp.*	8.0	R	18.0	S	26.5	I
10.1	*Strep spp.*	39.0	S	20.5	S	30.0	S
7.3	*Entero spp.*	8.5	R	20.5	S	29.0	S
8.3	*Entero spp.*	25.0	S	11.0	R	24.5	S
9.2	*Entero spp.*	24.0	S	25.5	S	25.5	S
10.2	*Entero spp.*	20.5	S	21.5	S	31.0	S

Note: Amx (Amoxicillin), Azi (Azithromycin), Dox (Doxycicline), R (Resistance), I (Intermediate), and S (Sensitive).

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It can be seen from the Table 1, four isolates of *Staphylococcus* spp. were resistant to amoxicillin, and two isolates were resistant to cefotaxime. Resistance to amoxicillin and tetracycline was discovered in one isolate of *Streptococcus* spp., as well as resistance to cefotaxime in two isolates and two isolates were intermediate to doxycycline. One *Enterobacter* spp. isolate was resistant to amoxicillin and azithromycin, and two isolates were resistant to both.

Table 2. Antimicrobial sensitivity test (continued)

Code	Bacteria	Average diameter of inhibition zone (mm)					
		Tet		Ctx		Cip	
1.2	*S. epid*	33.0	S	30.5	S	47.0	S
6.2	*S. aureus*	30.5	S	33.0	S	29.5	S
7.1	*S. aureus*	27.0	S	9.0	R	24.5	S
7.2	*S. aureus*	35.0	S	36.5	S	28.0	S
7.4	*S. aureus*	24.0	S	7.5	R	250.	S
2.1	*Strep spp*	29.0	S	30.0	S	29.5	S
3.3	*Strep spp*	29.0	S	25.0	R	30.0	S
5.1	*Strep spp*	24.0	R	8.0	R	27.0	S
10.1	*Strep spp*	30.5	S	30.5	S	29.5	S
7.3	*Entero spp*	23.0	S	8.0	R	26.0	S
8.3	*Entero spp*	30.0	S	11.5	R	27.5	S
9.2	*Entero spp*	34.0	S	34.5	S	32.5	S
10.2	*Entero spp*	33.5	S	32.0	S	32.5	S

Note: Tet (Tetracycline), Ctx (Cefotaxime), Cip (Ciprofloxacin), R (Resistance), I (Intermediate), and S (Sensitive)

Amoxicillin resistance in *Staphylococcus aureus* may be due to the expression of the femX gene, which results in continuous repairing or abnormal thickening of cell walls, (Yao *et al.* 2019). Resistance in *Streptococcus* spp. is primarily caused by production of cytoplasmic proteins encoded by tet(M) (Foster 2014). Resistance to cefotaxime is frequently caused by the production of enzymes such as extended spectrum β-lactamases

Third-generation cephalosporins are likely to induce or select derepressed Enterobacter genetic variants of AmpC β-lactamase, resulting in enzyme overproduction and resistance. Resistance to azithromycin is due to changing the binding site or target through ribosome component mutation and increasing efflux pump activity (Parnham *et al*. 2014).

■ CONCLUSION

This study provides information on the current antimicrobial resistance in URI bacteria from cat in Bogor, which may help to guide clinicians for the appropriate use of antimicrobials.

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