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RESEARCH ARTICLE

The antimicrobial susceptibility of *Ornithobacterium rhinotracheale* isolates

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Özet

Erganiş O, Hadimli HH, Kav K, Sayın Z. *Ornithobacterium rhinotracheale* izolatlarının antimikrobiyel duyarlılıkları. **Eurasian J Vet Sci, 2012, 28, 1, 27-30**

Amaç: Bu çalışmada, yumurtacı tavuk, etçi tavuk ve hindilerden izole edilen *Ornithobacterium rhinotracheale* izolatlarının antimikrobiyal maddelere duyarlılıklarını belirlemek amaçlandı.

Gereç ve Yöntem: Toplam 28 *O. rhinotracheale* izolatı (2 yumurtacı tavuk, 5 etçi tavuk, 21 hindi, 2 *O. rhinotracheale* standart suşu) test edildi. On sekiz antimikrobiyal disk (penisilin, ampisilin, amoksisilin, amoksisilin + klavulonik asit, enrofloksasin, siprofloksasin, danofloksasin, norfloksasin, oksitetrasiklin, trimetoprim + sulfametoksazol, klaritomisin, linkomisin, eritromisin, spiramisin, klindamisin, gentamisin, neomisin ve streptomisin) kullanılarak, *O. rhinotracheale* izolatlarının antimikrobiyel maddelere duyarlılıkları belirlendi.

Bulgular: *O. rhinotracheale* izolatlarının tümü (%100) ampisilin, amoksisilin ve siprofloksasine duyarlı iken gentamisin, streptomisin ve trimetoprim + sulfametaksazola dirençli bulundu.

Öneri: *O. rhinotracheale* enfeksiyonlarının tedavisinde öncelikle etkenin antibiyotik duyarlılıklarının belirlenmesi gerektiği kanaatine varıldı.

Abstract

Erganis O, Hadimli HH, Kav K, Sayin Z. The antimicrobial susceptibility of *Ornithobacterium rhinotracheale* isolates. **Eurasian J Vet Sci, 2012, 28, 1, 27-30**

Aim: The aim of the study was to determine susceptibility of *Ornithobacterium rhinotracheale* isolates to antibiotics from layers, broilers and turkeys.

Materials and Methods: The total of 28 isolates (2 layer pullets, 5 broilers, 21 turkeys and 2 standard strains) of *O. rhinotracheale* were tested. Eighteen antimicrobial discs (penicillin, ampicillin, amoxicillin, amoxicillin + clavulanic acid, oxytetracycline, enrofloxacin, ciprofloxacin, danofloxacin, norfloxacin, trimethoprim + sulfamethoxazole, clarithromycin, lincomycin, clindamycin, erythromycin, spiramycin, gentamicin, neomycin and streptomycin) were used to determine the susceptibility of *O. rhinotracheale* isolates to antimicrobials.

Results: While all *O. rhinotracheale* isolates (100%) were susceptible to ampicillin, amoxicillin and ciprofloxacin, all of *O. rhinotracheale* isolates (100%) were resistant to gentamicin, streptomycin and trimethoprim + sulfamethoxazole.

Conclusion: In the treatment of *O. rhinotracheale* infections firstly antibiotic sensitivity should be determined.

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Keywords: *Ornithobacterium rhinotracheale*, antimicrobial susceptibility, poultry

► Introduction

Ornithobacterium rhinotracheale is an infectious agent that has been ascribed an aetiologic role in the respiratory disease complex in poultry (Van Beek 1994, Vandamme et al 1994, Hafez 1996, Chin and Droual 1997). *O. rhinotracheale,* pleomorphic gram-negative, rod-shaped bacterium, is generally isolated from the respiratory tract of affected most of birds (Szalay et al 2002). The major economic losses due to *O. rhinotracheale* infection result from the rejection of carcasses for consumption, growth retardation, and mortality (Van Beek 1994, Van Veen 2000). The infection of *O. rhinotracheale* could be form several clinical signs such as tracheitis, airsacculitis, pericarditis, sinusitis, and exudative pneumonia (Hinz et al 1994, Van Empel et al 1996, Travers and Coetzee 1996, Van Empel and Hafez 1999).

Antimicrobial resistance in nearly all human and animal pathogens is on the increase (Malik et al 2003). It notified that the sensitivity of *O. rhinotracheale* to antimicrobials is very variable to depend on the source of the strain (Dodouyt et al 1995, Devriese and De Herdt 2001, Soriano et al 2003). Sometimes, the treatmen of *O. rhinotracheale* infections with antibiotics can be unsuccessfully, because the bacterium rapidly develops antibiotic resistances (Devriese et al 2001). It has been reported that the susceptibility of *O. rhinotracheale* strains is very inconsistent to antibiotics (Ak and Turan 2001, Erganiş et al 2002, Hadimli et al 2003).

The aim of the study was to determine antimicrobial susceptibility of *O. rhinotracheale* isolates from layers, broilers and turkeys.

► Materials and Methods

• *Bacterial strains*

The total 28 isolates of *O. rhinotracheale* were used: 2 layer pullets, 5 broilers (Provided from Dr. Turky-ilmaz, Adnan Menderes University, Faculty of Veterinary Medicine, Department of Microbiology, Aydin, Turkey) and 21 turkeys. The isolates of *O. rhinotracheale* were isolated from turkeys and chickens in different flocks located in 3 geographical regions (Konya, Bolu and Ankara) of Turkey. The reference strains of *O. rhinotracheale* were also used.

• *Antimicrobial sensitivity test*

Bacteria were streaked on Mueller-Hinton agar. The plates were micro aerobically incubated at 37 ^{0}C for 48-72 hours. Antimicrobial susceptibility test was performed by disk diffusion method (NCCLS 2002) using the following antimicrobial agents: Penicillin (10 IU), ampicillin (10 µg), amoxicillin (10 µg), amoxicillin + clavulanic acid (20 µg/10 µg), enrofloxacin (5 µg), ciprofloxacin (10 µg), danofloxacin (5 µg), norfloxacin (5 µg), oxytetracycline (30 µg), trimethoprim + sulfamethoxazole (1.25 µg/23.75 µg), clarithromycin (15 µg), lincomycin (5 µg), erythromycin (16 µg), spiramycin (100 µg), gentamicin (10 µg), neomycin (10 µg), streptomycin (5 µg) and clindamycin (2 µg).

► Results

All *O. rhinotracheale* isolates (100%) were susceptible to ampicillin, amoxicillin and ciprofloxacin. Of isolates, 29 (96.66%) were sensitive to oxytetracycline, amoxicillin + clavulanic acid and enrofloxacin, 28 (93.33%) to penicillin and clarithromycin, 27 (90.00%) to lincomycin and erythromycin, 26 (86.66%) to clindamycin.

All of *O. rhinotracheale* isolates (100%) were resistant to gentamicin, streptomycin and trimethoprim + sulfamethoxazole. Of isolates, 18 (60.00%) were resistant to norfloxacin, 22 (73.33%) to danofloxacin, 26 (86.33%) to spiramycin and 29 (96.66%) to neomycin (Table1).

Table 1. Antimicrobial susceptibility of O. rhinotracheale isolates.

Antimicrobials	Susceptible		Resistant	
	n	%	n	%
P	28	93.33	2	6.66
AML	30	100	-	0
AMP	30	100	-	0
AMC	29	96.66	1	3.33
E	27	90.00	3	10.00
L	27	90.00	3	10.00
CLR	28	93.33	2	6.66
DA	26	86.66	4	13.33
SH	4	13.33	26	86.33
N	1	3.33	29	96.66
CN	-	-	30	100
S	-	0	30	100
CIP	30	100	-	0
ENR	29	96.66	1	3.33
NOR	12	40.00	18	60.00
DFX	8	26.66	22	73.33
OT	29	96.66	1	3.33
SXT	-	0	30	100

P: Penicillin G, AML: Amoxicillin, AMP: Ampicillin, AMC: Amoxicillin + Clavulanic acid, E: Erythromycin, L: Lincomycin, CLR: Clarithromycin, DA: Clindamycin, SH: Spiramycin, N: Neomycin, CN: Gentamicin, S: Streptomycin, CIP: Ciprofloxacin, ENR: Enrofloxacin, NOR: Norfloxacin DFX: Danofloxacin, OT: Oxytetracycline, SXT: Trimethoprim + Sulfamethoxazole,

► Discussion

The diseases of respiratory system are commonly most problem in poultry and the majority of these problems cannot be cure with antimicrobials (Van Beek 1994). The susceptibility or resistant of *O. rhinotracheale* to antimicrobial agents can be different to depend on the isolates, sources and type of animals.

It is notified that while the *O. rhinotracheale* isolates of Netherland were resistant to flemequine, they were susceptible to enrofloxacin, trimethoprim + sulfamethoxazole, tetracycline and ampicillin (Van Empel and Hafez 1999). It has been reported that, in

Germany, 90-100% of *O. rhinotracheale* isolates are resistant to enrofloxacin, neomycin, gentamicin and trimethoprim + sulfamethoxazole, but sensitive to tetracycline, chloramphenicol and amoxicillin (Hafez 1996). Furthermore, it has been reported that American isolates are sensitive to ampicillin, erythromycin, penicillin, spectinomycin and tylosin (Van Empel and Hafez 1999).

Erganiş et al (2002) demonstrated that *O. rhinotracheale* isolates isolated from laying hens were sensitive to ofloxacin, erythromycin, lincomycin, amoxicillin and amoxicillin + clavulanic acid, but resistant to streptomycin, neomycin, neomycin + tetracycline, gentamicin, trimethoprim +sulfamethoxazole. In another study conducted by Ak and Turan (2001), it was determined that while 11 *O. rhinotracheale* isolates isolated from broilers were resistant to gentamycin and neomycin, all isolates were found to be sensitive to oxytetracycline, less sensitive to erythromycin and penicillin, and but resistant to danofloxacin.

Devriese et al (2001) ascertained that all of the 45 isolates were resistant to lincomycin, ampicillin and ceftiofur, whilst 90% were resistant to tylosin, spiramycin and flumequine, several isolates were also sensitive to enrofloxacin and doxycycline, and all strains were sensitive to tiamulin.

Hadimli et al (2003) reported that an *O. rhinotracheale* strain isolated from turkeys was 100% sensitive to ampicillin, amoxicillin, amoxicillin + clavulanic acid, kanamycin + cefalexin, moderately sensitive to neomycin+ tetracycline and neomycin, and lowly sensitive to penicillin, florfenicol and novobiocin. Furthermore, they determined that this isolates was resistant to norfloxacin, streptomycin, trimethoprim + sulfamethoxazole, trimethoprim, oxytetracycline, flumequine, danofloxacin, nalidixic acid, lincomycin, oxacillin, bacitracin, gentamycin and enrofloxacin. These researchers also ascertained that, based on the results of the antibiotic sensitivity test, when amoxicillin was administered to turkeys in drinking water for 5 days at a dose of 20 mg/kg, on the 2nd day of treatment the number of mortalities was observed to have been reduced and on the 4th day of treatment the alleviation of the clinical symptoms had started. Similarly, it has been reported that when chlortetracycline (500 ppm/4-5 days) and amoxicillin (250 ppm/3-7 days) were administered to infected poultry in drinking water, success was achieved with treatment (Hafez 1996). Hinz et al (1994) determined that amoxicillin treatment (200-300 ppm) in 23-week-old turkeys infected with *O. rhinotracheale* infection were successful.

Sorione et al (2003) stated that the sensitivity of Mexican *O. rhinotracheale* isolates to amoxicillin, enrofloxacin and oxytetracycline varied, and that the minimum inhibitory concentrations (MICs) of gentamicin, phosphomycin, trimethoprim, sulphamethazine, sulfamerazine, sulfaquinoxaline and sulfachloropyridazine were rather high. In this context, they indicated that a marked trend of antimicrobial resistance was observed in Mexican isolates.

In 3-week-old turkeys infected with avian pneumovirus; following the inoculation of *O. rhinotracheale, Escherichia coli* O2:K1 (Marien et al 2006a) and *O. rhinotracheale* (Marien et al 2006b) treatment with enrofloxacin (in drinking water for 3-5 days) and florphenicol (in drinking water for 5 days) yielded success, resulting in an evident decrease in clinical symptoms and a reduction in the re-isolation rate of *O. rhinotracheale*. On the other hand, they reported that amoxicillin (administered in drinking water for 5 days) did not produce any clinical effect in both study (Marien et al 2006a, 2006b, 2006c).

Garmyn et al (2009) indicated that the addition of enrofloxacin into drinking water for the treatment of respiratory infections in turkeys had found common use in practice, and also reported that when compared to the administration of the total treatment dose of the antibiotic (50 mg/kg) in a single day, its addition into drinking water for a period of 5 days (10 mg/kg) proved to be more effective in eliminating the causative agent, and reducing the severity and duration of the disease. Furthermore, acquired fluoroquinolone resistance is frequently encountered in *O. rhinotracheale* isolates (Garmyn et al 2009).

Tsai and Huang (2003) reported that 40 *O. rhinotracheale* strains were isolated from 28 chickens and 12 in Taiwan. While, most of the chicken isolates (80%) were sensitive to amoxicillin, ampicillin, penicillin and oxytetracycline, in contrast, the majority of the chicken isolates were resistant to clindamycin, erythromycin, and trimethoprim + sulfamethoxazol. They notified that the trend of the resistance rate to antibiotics was similar, but lower, in the pigeon isolates. There were significant differences in the resistance rates to clindamycin, erythromycin, gentamicin, and tetracycline between chicken and pigeon isolates.

In this study, it was demonstrated that *O. rhinotracheale* isolates were more sensitive to ampicillin, amoxicillin, amoxicillin + clavulanic acid, ciprofloxacin, enrofloxacin, clarithromycin, erythromycin, oxytetracycline and penicillin but resistance to trimethoprim + sulfamethoxazole, gentamicin, neomycin, spiramycin and streptomycin. According to these results, the treatment of *O. rhinotracheale* infection beta-lactam antibiotics such as amoxicillin, ampicillin and penicillin would be the first choice for the treatment of the *O. rhinotracheale* infections in Turkey. These results emphasize the need for continued monitoring of *O. rhinotracheale* isolates for antibiotic resistance and establishment of baseline resistance pattern data for this organism. These data can then be used to design and evaluate local epidemiological interventions.

► Conclusions

It was determined that the antibiotic sensitivity of *O. rhinotracheale* isolates recovered from broiler chickens, laying hens, breeder chickens and turkeys varied with the region of isolation and source. In view of the possibility of *O. rhinotracheale* isolates having acquired resistance to antibiotics, which are used for a broad spectrum of purposes in veterinary medicine, it was concluded that in cases where the treatment of *O. rhinotracheale* infections is aimed, firstly antibiotic sensitivity should be determined.

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