The antimicrobial susceptibility of *Ornithobacterium rhinotracheale* isolates

Osman Erganiş, H. Hüseyin Hadimli*, Kürşat Kav, Zafer Sayın

**Abstract**


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, danofoxacin, 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.

Anahtar kelimeler: *Ornithobacterium rhinotracheale*, antibiyotik duyarılığı, kanatlı hayvan

Keywords: *Ornithobacterium rhinotracheale*, antimicrobial susceptibility, poultry
Introduction

Ornithobacterium rhinotracheale is an infectious agent that has been ascribed an aetiological 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 form several clinical signs such as tracheitis, airsacculitis, pericarditis, sinusitis, and exudative pneumonia (Hinz et al 1994, Van Empel et al 1996, Travers and Coetzez 1996, Van Empel and Hafez 1999).


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. Turkyilmaz, 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 °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).

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 flumequine, they were susceptible to enrofloxacin, trimethoprim + sulfamethoxazole, tetracycline and ampicillin (Van Empel and Hafez 1999). It has been reported that, in

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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 cefotiofur, 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.

Hadiımlı 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, but sensitive to oxytetracycline, and resistant to 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 chlorotetracycline (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 was 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, sulfadiazine 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 florfenicol (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 amoxicillin, amoxicillin + clavulanic acid, ciprofloxacin, enrofloxacin, clarithromycin, erythromycin, oxytetracycline and penicillin but resistance to trimethoprim + sulfamethoxazol, 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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References


