Antibiotic Sensitivity Patterns among Indian Strains of Avian *Pasteurella multocida*

S.B. Shivachandra*, A.A. Kumar, A. Biswas, M.A. Ramakrishnan, Vijendra P. Singh and S.K. Srivastava

Division of Bacteriology and Mycology, Indian Veterinary Research Institute, Izatnagar 243122 (U.P.) India

*Correspondence: E-mail: sbshivachandra@rediffmail.com


ABSTRACT

An investigation was carried out to study the antibiotic sensitivity of avian strains of *Pasteurella multocida* and to select an effective antimicrobial agent for control of avian pasteurellosis in India. A total of 123 strains of *P. multocida* recently isolated from different avian species (chicken, duck, turkey, quail, and goose), from different regions of India were subjected to antibiotic sensitivity tests using 20 different antibiotics. Absolute resistance was observed against sulfadiazine. The studies indicated that the strains were most sensitive to chloramphenicol (73.98%), followed by enrofloxacin (71.54%), lincomycin (64.23%), norfloxacin (61.79%) and doxycycline-HCl (56.91%). The majority of the strains were found to exhibit intermediate sensitivity. Chloramphenicol was selected and suggested for treatment. Antibiogram studies also revealed the emergence of multidrug-resistant strains of *P. multocida* among Indian poultry.

Keywords: antibiotics, avian, *Pasteurella multocida*, sensitivity patterns

Abbreviations: BHI, brain heart infusion; bp, base pairs; DNA, deoxyribonucleic acid; dNTPs, deoxynucleotide triphosphates; PM, *Pasteurella multocida*; PCR, polymerase chain reaction

INTRODUCTION

Fowl cholera, caused by the Gram-negative bacterial pathogen *Pasteurella multocida*, is a disease of economic importance in commercially produced poultry, backyard poultry and other avian species. It may occur in different forms including peracute, acute and chronic infections (Rimler and Glisson, 1997; Christensen and Bisgaard, 2000). However, the disease usually occurs as an acute septicaemia with high morbidity and mortality rates or as a chronic localized infection of joints and sinuses (Rimler and Glisson, 1997).

Antibacterial therapy has been used extensively in the treatment of fowl cholera, with varying success depending mainly on the kind of drug used (Rimler and Glisson, 1997). Conventional approaches to combating fowl cholera/bacterial diseases in poultry are hampered owing to injudicious and indiscriminate use of antibiotics, which is leading to concern about antibiotic residues in poultry meat because of the
emergence of microbial resistance in humans. This warrants periodic assessment of sensitivity/resistance pattern to enable selective, effective and judicious use of antimicrobial agents.

In India there is scant literature pertaining to resistance to drugs against avian cholera as the disease is treated with oxytetracycline, co-trimoxazole (Ramaswamy and Ramara, 1989), a combination of penicillin and streptomycin, or sulphadiazine sulphamethazine, all of which are deemed to be effective (Madhekar et al., 1982). Although there have been reports on the antibiotic sensitivity of strains from particular regions or outbreaks (Kulkarni et al., 1990; Rajini et al., 1995), the scenario of sensitivity from different avian hosts and regions still needs to be determined.

The present investigation was carried out to study the antibiotic sensitivity/resistance patterns of avian Pasteurella multocida strains to allow selection of effective chemotherapeutic agents in order to implement effective control measures.

MATERIALS AND METHODS

Bacterial strains

One hundred and twenty-three strains of Pasteurella multocida were obtained from the Division of Bacteriology and Mycology, IVRI, Izatnagar. All the P. multocida strains were from outbreaks of fowl cholera from different avian hosts and various geographical regions of India. A total of 110 avian P. multocida strains received on blood agar slopes during the past two years and 13 lyophilized cultures were revived in 3 ml of BHI broth and incubated overnight at 37°C. Cultural, morphological, biochemical and sugar fermentation tests were carried out following the standard procedures described by Cowan and Steel (1970) and Cruickshank and colleagues (1975) to confirm P. multocida strains.

All the strains used in the study were also subjected to rapid detection by the preparation of different types of templates, viz. genomic DNA, bacterial culture lysate and direct bacterial colony, according to the methods described in earlier reports (Wilson, 1987; Townsend et al., 1998). Pasteurella multocida specific (PM)-PCR was conducted according to the standard method of Townsend and colleagues (1998) using primer sets designed from the sequence of the clone KMT1 (KMTT17 and KMTT1SP6) for the specific detection of P. multocida strains.

Antimicrobial sensitivity of strains

All of the 123 avian P. multocida strains were tested for their sensitivity against 20 antimicrobial agents. The antibiogram of all the strains was determined on Müller–Hinton medium supplemented with 5% blood according to the disc-diffusion method described by Carter and Subronto (1973).

Each strain, consisting of 200 µl of an 18 h-old culture was spread evenly on plates. The culture was allowed to absorb onto the plate for 10 min and then antimicrobial