ANTIBIOTIC VULNERABILITY RESPONSE OF AVIAN PATHOGENIC E.COLI SEROTYPES FROM SMALL AND LARGE POULTRY FARMS OF NAGPUR

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ABSTRACT

A study was undertaken to establish the correlation between serogroups of Escherichia coli and to unreveal their antibiotic vulnerability response. A total of eighty seven avian pathogenic Escherichia coli (APEC) strains were examined for studying their vulnerability response to antimicrobials of veterinary and human significance. 73 APEC isolates belonged to thirteen different serogroups and the rest were untypable. Antibiogram profiles indicated 100% resistance to ampicillin, nalidixic acid, ofloxacin and nitrofurantoin, 96% to norfloxacin, 92% to ciprofloxacin, 88% to tetracycline, 80% to oxytetracycline and 60% to chloramphenicol. The isolates were sensitive to amikacin (100%), gentamycin (64%), streptomycin (96%), colistin (76%), cephalexin (76%) and ceftazidime (76%). These findings confirm that most of the isolates were resistant to five or more antimicrobials. Hence this empirical treatment to reduce the emergence and spread of resistant strains requires constant updating of the antibiotic vulnerability of the main etiological agent of that area, region or country.

KEY WORDS - Antibiotic vulnerability, serotypes, colibacillosis, APEC.

INTRODUCTION

In the past few years, both the incidence and severity of colibacillosis have increased rapidly, and current trends indicate that it is likely to continue and become an even greater problem in the poultry industry (Altekruse et al., 2002). Antimicrobial therapy is an important tool in reducing both the incidence and mortality associated with avian colibacillosis (Freed et al., 1993). Resistance to two or more classes of antibiotics is now common in both veterinary (Gonzalez and Blanco, 1989) and human (Dennesen et al., 1998) medicine. Avian pathogenic E. coli (APEC) most commonly belongs to O1, O2, or O78 and typically possesses virulence factors such as lipopolysaccharide, temperature-sensitive hemagglutination (Tsh), and increased serum survival factor (ISS) (La Ragione et al., 2002). However, the distribution and frequencies of the most prevalent serogroups can vary considerably, both geographically and temporally (Frydendahl, 2002).

The present study was undertaken to examine antibiotic vulnerability response of APEC in correlation with their serotypes recovered from some poultry farms of Nagpur, to provide a baseline of antimicrobial resistance among these pathogens for future studies.

MATERIALS AND METHODS

A total of 87 samples from infected birds of 2-6 weeks of age were collected. The infected tissues were collected in sterile containers following aseptic precautions and transported to laboratory for further use

Isolation and identification of E. Coli were performed by standard bacteriological methods. Specimens were cultured on McConkey and EMB agar. Sampling was done with 105 broiler chickens (2 -6 weeks of age) during March 2012 to August 2012 from different poultry farms in and around Nagpur. The isolates were submitted to National Salmonella and Escherichia centre, Kasauli, H.P, India for Serotyping.

Antibiotic vulnerability test was performed according to the standard procedure of Bauer et al., (1966). Octadiscs of antibiotics (HI MEDIA, India) with varying potency were placed aseptically on Mueller Hinton Agar plates (HI MEDIA). The antibiotic discs applied were: Ampicillin (30µg), Nitrofurantoin (300µg), Nalidixic acid (30µg), Ofloxacin (5µg), Norfloxacin (10µ), Ciprofloxacin (30µg), Tetracycline (30µg), Oxytetracycline (30µg), Chloramphenicol (30µg), Amikacin (30µg), Streptomycin (10µg), Colistin (10µg), Gentamycin (10µg), Ceftazidime (30µg), Cephalexin (30µg).

RESULT AND DISCUSSION

Serotyping :

Out of 87 APEC isolates, 73 E. coli isolates belonged to 13 different O serotypes;O106 (25%) ,O143(15 %), O153 (10%), O17 (10%),O36(8%), O84 (8%), O55(4%),O89 (4%),O32(4%), O80 (3%), O39 (3%), O90 (3%), O3(3%) however, 14 were untypable.

Antibiotic vulnerability Profile:

Antimicrobial reponse of these avian Escherichia coli serotypes was found to be variable. Serotypes O106, O143 and O84 were resistant to ampicillin, Nitrofurantoin, Nalidixic acid, Ofloxacin, Norfloxacin, Ciprofloxacin, Tetracycline, Oxytetracycline. However, in addition to these antibiotics Serotype O84 and O55 showed resistance to Gentamycin and chloramphenicol also.

In the present investigation highest per cent of APEC isolates were recovered from cases of perihepatitis (86%) indicating the acute nature of the disease (Krishnamohan et al., 1994) followed by pericarditis (12 %) and enteritis (2 %). Incidence of pericarditis in poultry was always encountered in association with perihepatitis and enteritis indicating that these isolates could be highly virulent (Ghosh, 1998; Krishanmohan et al., (1994).

The antibiotic vulnerability profile indicated that except amikacin none of the antibiotics were 100% effective in controlling APEC strains. These findings corroborates with the observations of Guerra et al. (2003) and Saenz et al. (2003). Antibiogram profiles indicated maximum resistance to β-lactam antibacterials like ampicillin (100%), quinolones like nalidixic acid (100%), fluoroquinolones like ofloxacin (100%), norfloxacin (96%), ciprofloxacin (92%), polyketide antibiotics like tetracycline (88%), oxytetracycline (80%); nitrofurantoin (100%), and chloramphenicol (60%). These results are in concordance with those of Sharada et al. (2009). This multiple antibiotic resistance may be attributed to variations of E. Coli serotypes which is reflective of heterogeneity among these isolates, indiscriminate use of various antibiotics and transfer of drug resistance in them.

High prevalence of Quinolone - resistant E. Coli (QREC) in various poultry farms under study located in this region indicate the overuse of ciprofloxacin in treating colibacillosis. These were the important findings which are in concordance with the study of salehi and Bonab (2006).

In conclusion, the introduction of surveillance program to monitor drug resistance in APEC should be routinely implemented. Other parameters like sanitation and crowding of flocks, also can not be overlooked, as these factors play a major role in increasing resistance.

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