ANTIMICROBIAL RESISTANCE PATTERNS OF ESCHERICHIA COLI ISOLATES FROM BROILER FLOCKS IN ARDABIL PROVINCE TO SIX ANTIBACTERIAL AGENTS COMMONLY USED IN THE IRANIAN POULTRY INDUSTRY

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ABSTRACT

Colibacillosis is one of the most prevalent bacterial diseases in poultry with huge economic losses that is caused by Escherichia coli. Antimicrobial therapy is an important tool in reducing both the incidence and mortality associated with colibacillosis. But, enormous use of antibiotics in poultry medicine has been increased the number of resistant bacterial strains in recent years. The purpose of this study was to investigated the antimicrobial resistance pattern of 178 E.coli isolates from 40 broiler flocks with colibacillosis clinical signs in ardabil province, northwest of Iran. The antimicrobial susceptibility of total isolates to six antibacterial agents commonly used in the Iranian poultry industrywas tested from March 2014 to February 2015. These antibacterial agents include Colisten, Doxycycline, Sulfamethoxazole + Trimethoprime, Enrofloxacin, Florfenicol and Lincospectine. According to disk diffusion method, the maximum resistance was to Doxycycline (81.47%), Enrofloxacin (77.53%), Sulfadiazine + Trimethoprime (71.91%), Colistin (68.54%), Florfenicol (58.99%), Lincospectine (36.52%), respectively. The results of this study showed the high frequency of resistance to antimicrobial agents commonly used in the Iranian poultry industry. It can attributed to the incorrect use of antibiotics in poultry industry. So, National monitoring programs is strongly needed for antimicrobial resistance and for a rational use of antibiotics.

Keywords: *E.coli, Broiler Flocks, Antibiotic Resistance, Ardabil Province*

INTRODUCTION

Escherichia coli is the most important agent causing secondary bacterial infection in poultry and may also be a primary pathogen (Saif, 2003). Colibacillosis that is caused by avian pathogenic *Escherichia coli* (APEC) is the most frequently reported disease in surveys of poultry diseases or condemnations at processing (Saif, 2003). It is responsible for large economic losses in poultry industry worldwide (Hammoudi and Aggad, 2008). Antimicrobial therapy is an important tool in reducing both the incidence and mortality associated with avian Colibacillosis (Watts, et al., 1993; Guerra, et al, 2003; Miles, et al, 2006). But, enormous use of antibiotics in poultry medicine has been increased the number of resistant bacterial strains and loss of the efficacy of treatments in recent years. (Hammoudi and Aggad, 2008; Madadi et al., 2014). The purpose of this study was to determined the antimicrobial resistancepattern among a collection of avian pathogenic E. coli recovered from broiler flocks diagnosed with colibacillosis in ardabil province, northwest of Iran during 2014-2015.

MATERIALS AND METHODS

Bacterial isolates

Isolation and identification of *E. coli* were performed by conventional bacteriological methods (Hammoudi and Aggad, 2008). 178 E.coli isolates were collected from 40 broiler flocks with colibacillosis clinical signs in ardabil province, northern of Iran from March 2014 to February 2015.The antimicrobial susceptibility of these isolates to six antibacterial agents commonly used in the Iranian poultry industry were testedby disk diffusion method (Bozorgmehri Fard et al., 2008).

Antibacterial agents

Antibacterial agents that are commonly used in the Iranian poultry industry include Colistin, Doxycycline, Enrofloxacin, Florfenicol, Lincospectine and Sulfadiazine + Trimethoprime.

RESULTS

Antimicrobial resistance patterns observed for isolates are shown in Table 1. Among E. coli isolates, the maximum resistance was to Doxycycline, Enrofloxacin, Sulfadiazine + Trimethoprime (Sultrim), Colistin, Florfenicol and Lincospectine, respectively. The highest and lowest resistance frequencies were observed to Doxycycline (81.47%) and to Lincospectine (36.52%), respectively.

Table1. Antibiotic resistance patterns of 178 E.coli isolates to six antimicrobial agents

Antimicrobial agents	% of isolate		
	Resistant	Intrmedate Susceptible	Susceptible
Doxycycline	81.47	16.85	1.68
Enrofluxacine	77.53	13.48	8.99
Trimethoperim /Sulfamethoxazol	71.91	11.80	16.29
Colsitin	68.54	24.16	7.30
Florfenicol	58.99	12.92	28.09
Lincospectine	36.52	22.47	41.01

DISCUSSION

E. coli may be sensitive to many antibiotics (Bozorgmehri Fard et al., 2008; Khoshkhoo and Peighambari,2005). However, isolates of E. coli from poultry are frequently resistant to one or more antibiotics, especially if they have been widely used in poultry industry over a long period (e.g., tetracyclines) (Watts et al., 1993; Blanco et al., 1997; Madadi et al., 2014). Khoshkhoo and Peighambari (2005) reported that 96.7%, 94%, 72.6%, 66%, 64.7% and 46.7% of 150 *E. coli* isolates were resistant to colistin, tetracycline, sulfamethoxazole + trimethoprime, enrofloxacin, Lincospectine and florfenicol, respectively (6). Zahraei and Farashi (2006) observed that among 50 *E.coli* isolates from broiler flocks the antimicrobial resistance patterns include doxycycline (88%), sulfamethoxazole + trimethoprime (80%), enrofloxacin (76%), florfenicol (27%), Lincospectine (15%), and colistin (6%), respectively (13). In the period of 2005-2006, the frequencies of resistance od 103 *E.coli* isolates to Antibacterial agents were as follows:colistin 100%, tetracycline 96%, lincospectine 79%, enrofloxacin 76% and florfenicol 39%. (Saberfar et al., 2008). Resistance frequencies of 54%, 43%, 33% and 1.2% to enrofloxacin, tetracycline, Sultrim and lincospectine were observed among 72 *E.coli* isolates sampled in 2005, respectively (Bozorgmehri Fard et al., 2008). In more comprehensive study in eight provinces, the maximum

resistance was to sulfamethoxazole + trimethoprime (67%), doxycycline (60%), enrofloxacin (42%), colistin (35%) and florfenicol (34%), respectively (Ghaniei and Peighambari, 2011). A recent study from northwest of Iran in 2014, the lowest resistant antibiotics were florfenicol (2006-2008) and lincospectine (2009-2011), While tylosin (2006-2008) and erythromycin and tetracycline (2009-2011) were the most resistant (Madadi et al., 2014). A report from Northern Georgia indicated that the majority of 95 APEC isolates displayed resistance to sulfamethoxazole (93%), tetracycline (87%), and enrofloxacin (52%) (Zhao et al., 2005). In this study, all the *E. coli* isolates showed high frequency of resistance to the six antibacterial agents commonly used in the Iranian poultry industry. Similar to the findings of previous studies had done in Iran and other countries, multiple antibiotic resistances was observed in all of the examined strains (Blanco,

et al., 1997; Guerra et al., 2003; Miles, et al, 2006; Zahraei and Farashi, 2006; Hammoudi and Aggad, 2008; Madadi et al., 2014). This is most probably due to increased use of antibiotics (Madadi et al., 2014). Antimicrobial-resistant pathogens pose a severe and costly animal health problem in that they may prolong illness and decrease productivity through higher morbidity and mortality (Xu, 2001). In addition, there is also concern that antimicrobial use in food animals can lead to the selection of antimicrobial resistant zoonotic enteric pathogens which may then be transferred to people by the consumption of contaminated food (especially poultry) or by direct animal contact(Saberfar et al., 2008; Madadi et al., 2014). Therefore, National monitoring programs is strongly needed for antimicrobial resistance and for a rational use of antibiotics. Also antibiotics sensitivity test is suggested in order to find out an overview of antimicrobial susceptibility pattern in all provinces

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