



Antibiotic Sensitivity of *E. coli* and *Salmonella* isolated From Chicken

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Abstract: Antimicrobial susceptibility among four bacterial isolates: three isolates of avian pathogenic *Escherichia coli* (O78, O26 and O1) and one isolate of *Salmonella* strains (*Salmonella* Typhimurium) were studied. All these bacterial strains were isolated from diseased birds diagnosed with Colibacillosis and Salmonellosis. The results were indicated that all four isolates were sensitive to Gentamycine (100%), while one of *E.coli* strains (serogroup, O26) and *Salmonella* Typhimurium were sensitive to Colistin. All isolates were resistant to Penicillin, Tetracyclines and Amoxicillin. Antibiotic-resistant bacteria and antibiotics discharged in various amounts in the environment due to indiscriminate use of antibiotics in medical, veterinary and agricultural practices lead to multiple antibiotic resistances in bacterial pathogens.

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1. Introduction

Escherichia coli (*E. coli*) and *Salmonella* (*S.*) *species* are a major pathogens of worldwide importance in commercially produced poultry, contributing significantly to economic losses in chickens. Antimicrobial therapy is an important tool in reducing the incidence and mortality associated with Avian Colibacillosis and Salmonellosis. However, resistance to existing antimicrobials is widespread and of concern to poultry veterinarians (**Barnes et al., 2003**).

During the last decade, there has been an alarming increase in the appearance of antibiotic-resistant bacteria as a result of poor management in antibiotic consumption. The administration of antimicrobial agents in chickens creates selection pressure that favors the survival of antibiotic-resistant pathogens. Resistance of *E.coli* and *Salmonella species* to commonly used antimicrobials is increasing, both in the veterinary field and the public health sector and has emerged as a global challenge (**Molla et al. 2003**).

The present study determines antimicrobial susceptibility among a 3 isolates of avian pathogenic *E. coli* (O78, O26 and O1) and one isolate of *Salmonella* (*Salmonella* Typhimurium) isolated from diseased birds diagnosed with Colibacillosis and Salmonellosis.

2. Material and methods:

A study was conducted by analyzing samples of suspected diseased chickens that had referred to a laboratory. Chickens were euthanized and samples from the pericardial sac, liver and intestine were collected.

Bacteria

Three *E. coli* isolates (O78, O26 and O1) and one *Salmonella* isolate (*Salmonella* Typhimurium) were used for antibiogram studies. All strains were isolated from birds with lesions of Colibacillosis and Salmonellosis. The characteristics of these isolates were performed as bacteria were enriched on nutrient broth and plated on MacConkey agar plates and *Salmonella* Shigella agar. All bacterial isolates were microbiologically identified by standard biochemical identification methods (**Pezzlo, 1992 and Reisner et al., 1999**) and serotyped by using specific antisera. Antimicrobial susceptibility testing was performed by the Kirby-Bauer disk diffusion method according to **NCCLS, (1997)**.

Antibiotics

The antimicrobial agents selected for our analysis were antibiotics that were commonly included in the treatment of Colibacillosis and Salmonellosis in Egypt. (**NCCLS, 1997**). The antimicrobial agents which used were Gentamycin, Penicillin, Tetracycline, Amoxicillin and Colistin. Antimicrobial susceptibility results were rounded down if <0.5 and were presented as whole numbers if ≥0.5.

3. Results and Discussion

Table (1): Antimicrobial standard zone diameter (mm)

Common name of antibiotics	Disk potency (ug)	Standard zone diameter (mm)	
Gentamycin (GN)	10	R	12
		I	13-14
		S	15
Penicillin (P)	10	R	11 or less
		I	---
		S	22 or more
Tetracycline (Te)	30 I.U	R	14
		I	15-18
		S	19
Colistin (CL)	10 I.U	R	8
		I	9-10
		S	11
Amoxycillin (AML)	20	R	20 or less
		I	---
		S	29 or more

S: Sensitive, I: Intermediate, R: Resistant

Table (2): Antimicrobial susceptibility of *E.coli* and *Salmonella* Typhimurium isolated from chickens:

Common name of antibiotics	Antimicrobial susceptibility	Isolates			
		<i>E.coli</i>			<i>Salmonella</i> Typhimurium
		O78	O26	O1	
Gentamycin (GN)	R	-	-	-	-
	I	-	-	-	-
	S	+	+	+	+
Penicillin (P)	R	+	+	+	+
	I	-	-	-	-
	S	-	-	-	-
Tetracycline (Te)	R	+	+	+	+
	I	-	-	-	-
	S	-	-	-	-
Colistin (CL)	R	-	-	-	-
	I	-	+	-	+
	S	-	-	-	-
Amoxycillin (AML)	R	+	+	+	+
	I	-	-	-	-
	S	-	-	-	-

S: Sensitive, I: Intermediate, R: Resistant

Antibiotic usage is possibly the most important factor that promotes the emergence, selection, and dissemination of antibiotic-resistant microorganisms in veterinary medicine. In poultry flocks, inappropriate antibiotic therapy and using antibiotics as growth promoters may result in high antibiotic selection pressure. Therefore, poultry pathogenic bacteria contain a relatively high proportion of resistant isolates. These resistant bacteria cause problems in rearing poultry flocks and in human health. Hence, the Food and Drug Administration has emphasized that antibiotic-fed animals can produce and increase the spread of drug-resistant organisms to humans.

In this study four isolates; three isolates of *E. coli* sero groups O78, O26, O1 and one isolate of *Salmonella* (*Salmonella* Typhimurium) isolated from different chicken samples were tested for their sensitivity to various antibiotics. The results recorded were indicated that all four isolates were sensitive to Gentamycin (100%), while one of *E.coli* strain (serogroup, O26) and *Salmonella* Typhimurium were sensitive to Colistin. Whenever all isolates were resistant to Penicillin, Tetracycline and Amoxicillin as shown in table (2) and figures (1-4). The sensitivity of the isolates to Gentamycin (100%) observed in the present study was concurrent to the finding of

Rahman et al. (1997). While comparing the antibiotic sensitivity pattern of different isolates of *E. coli* strains, it was found that the isolates were sensitive to Gentamicin, Neomycin, Chloramphenicol, Ofloxacin, Ampicillin, Nalidixic acid and Nitrofurantoin, and resistant to Tetracycline, Cephalothin, Sulfisoxazole and Streptomycin (**Raida et al. 2005; Oyetayo et al. 2001**).



Figure 1: Antimicrobial susceptibility of *Salmonella* Typhimurium showing that it is sensitive to Gentamycin (GN) and Colistin (CL) but resistant to Penicillin (P), Tetracycline (Te) and Amoxycillin (AML)

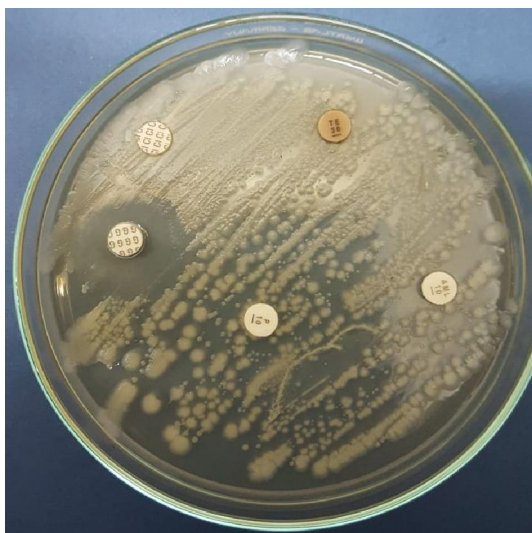


Figure 2: Antimicrobial susceptibility of *E. coli* (O78) showing that it is sensitive to Gentamycin (GN) but resistant to Colistin (CL), Penicillin (P), Tetracycline (Te) and Amoxycillin (AML).

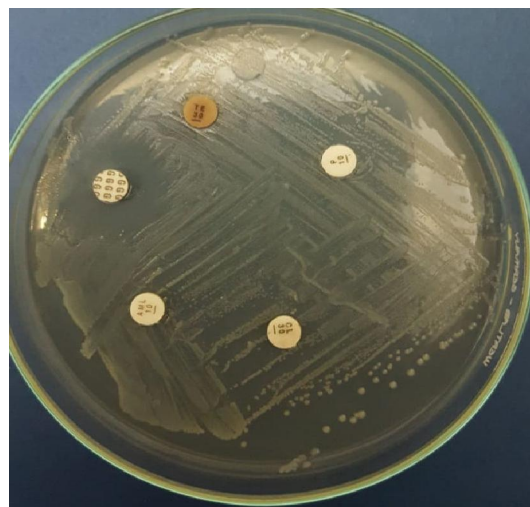


Figure 3: Antimicrobial susceptibility of *E. coli* (O1) showing that it is sensitive to Gentamycin (GN) but resistant to Colistin (CL), Penicillin (P), Tetracycline (Te) and Amoxycillin (AML)

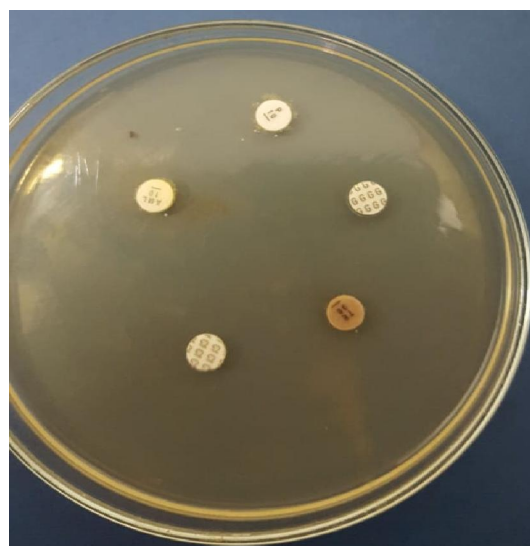


Figure 4: Antimicrobial susceptibility of *E. coli* (O26) showing that it is sensitive to Gentamycin (GN) and Colistin (CL) but resistant to, Penicillin (P), Tetracycline (Te) and Amoxycillin (AML).

In this study, all isolates were resistant to Penicillin, Tetracyclines and Amoxicillin, these reported susceptibilities are in harmony with reports of other investigators (**Yurdakok et al. 1997; Wasfy et al. 2000; Tambekar et al. 2007**).

Goni-Urriza et al. (2000) studied the antibiotic resistance of different isolates and reported that the isolates belonging to Enterobacteriaceae were resistant to Tetracycline, Nalidixic acid, and Beta-lactams and sensitive to Quinolone. The high incidence of multiple drug resistant is due to the injudicious use of antibiotics and exchange of antibiotic resistant genes

among bacterial populations. Antibiotic-resistant bacteria and antibiotics discharged in various amounts in the environment due to overuse of antibiotics in medical, veterinary and agricultural practices lead to multiple antibiotic resistances in bacterial pathogens.

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