Biological Forum – An International Journal **13(2): 772-774(2021)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Characterization and Multidrug Resistance Pattern of *E. coli*

Thangavel Kandasamy*
Assistant Professor, Department of Veterinary Microbiology,
Veterinary College and Research Institute, Namakkal (Tamil Nadu), India.

(Corresponding author: Thangavel Kandasamy)*
(Received 10 April 2021, Accepted 22 June, 2021)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: The occurrence of antibiotic-resistant bacteria has been a major public health problem. In this study, antibiotic resistance pattern of *E. coli* was investigated. The incidence of colibacillosis was 65% in poultry. This study also revealed that the 78% of *E. coli* isolates were more susceptible to levofloxacin (92.3%), enrofloxacin (88.4), ofloxacin (83.3%), gentamicin (73%), ceftriaxone (60.3) and neomycin (54%). The *E. coli* isolates were resistant to amoxicillin (74.6%), cloxacillin (70.6%), tetracycline (60%) and amikacin (50%). Indiscriminate use, improper selection, improper dose; incorrect duration of antibiotics at field level may be reason for such a increase in the occurrence of resistance. Reasonable use of antibiotics may prevent the occurrence of drug resistant *E. coli* in future.

Keywords : *E. coli*, antibiotic sensitivity, poultry, public health.

INTRODUCTION

Avian colibacillosis has been found to be major infectious diseases of all ages of layer and broiler birds. In most of countries it occurs sporadically or enzootically. The most important reservoir of *E. coli* is the intestinal tract of animals, including poultry. Egg transmission of pathogenic *Escherichiacoli* was common and responsible for high chick mortality. Harry and Hemsly (1965) reviewed that the pathogenic coliforms were more frequent in the gut of the newly hatched chicks than in eggs from which they hatched. Vaillancourt *et al*. (1992) reported that the morbidity and mortality varying in chicken from 10-50% or more and it leads to severe economic losses. Drug resistance of microorganisms to withstand antimicrobial agents is an important and growing public health issue. Until today very little works have been performed in our country on antibiotic resistant patternin poultry. Because of these constraints, this work has been under taken to study the prevelance of multidrug resistance in *E. coli* in poultry. The resistant pattern of *Escherichia coli* against antibiotics (Ceftriaxone, Ofloxacin, Amikacin, Gentamicin, Enrofloxacin, Levofloxacin, Amoxicillin, Oxytetracycline, Cloxacillin and Neomycin) was determined in this study.

MATERIAL AND METHODS

Collection of clinical samples. A total of 120 heart blood swabs were collected in sterile method (Ewing, 1986) from diseased and dead birds from poultry farms in and around Namakkal. The collected heart blood swabs were subjected bacteriological analysis.

Bacteriological examination. The collected clinical samples were inoculated in Nutrient broth and incubated for 18 h at 37°C. Then, a loopful from the previously inoculated broth was streaked onto MacConkey agar (Hi media) plates and incubated for 24 h at 37°C. Pink colored colonies were taken up and inoculated onto Eosin Methylene Blue (Hi media) and incubated at 37°C for 24 h. determination of *E. coli* isolates were performed based on the colony and biochemical tests as per Edwards and Ewing (1986).

Antibiotic sensitivity testing. Antibiotic sensitivity test was carried out as per Bauer *et al.* (1966). The antibiotic discs Gentamicin (10mcg), Amoxicillin (30mcg), Ofloxacin (5mcg), Amikacin (30mcg), Ceftriaxone (30mcg), Enrofloxacin (10mcg), Tetracycline (30mcg), Cloxacillin (30mcg) and Neomycin (30mcg), Levofloxacin (5mcg) were included in this study. The results were interpreted as per Clinical and Laboratory Standards Institute Guidelines (2011).

RESULTS AND DISCUSSION

As per Edwards and Ewing (1986) 78 positive cultures of *E. coli* (65%) *of E. coli* isolates were ascertained from 120 samples. The *E. coli* isolates were subjected to antibiotic sensitivity test and for their antimicrobial susceptibility (Table 1) and their pattern (Table 2) against 10 antimicrobial agents routinely used in the field was studied.

Table 1: Antibiotic sensitivity of *E. coli*.

Sr. No.	Antimicrobial agent	*No. E. coli isolates* susceptible	susceptibility %
1.	Cloxacillin	23	29.4
2.	Ceftriaxone	47	60.3
3.	Ofloxacin	65	83.3
4.	Levofloxacin	72	92.3
5.	Tetracycline	31	40
6.	Amoxicillin	20	25.6
7.	Enrofloxacin	69	88.4
8.	Amikacin	35	45
9.	Gentamicin	57	73
10.	Neomycin	42	54

The antibiogram revealed that the *E. coli* isolates more susceptible to levofloxacin (92.3%), enrofloxacin (88.4), ofloxacin (83.3%), gentamicin (73%), ceftriaxone (60.3) and neomycin (54%). The *E. coli* isolates were resistant to amoxicillin (74.6%), cloxacillin (70.6%), tetracycline (60%) and amikacin (50%). These results were well accorded with Johnson *et al.* (2007). Rationale use of these drugs may prevent development of resistant isolates of *E. coli* in future.

Table 2: Antibiotic sensitivity pattern of *E. coli*.

Sr. No.	Antibiotic sensitivity pattern	No. *E. coli* isolates
1.	LE, EX, OF, GEN, CTR, AK, TE, N, AX, COX,	3
2.	EX, OF, GEN, N,	5
3.	LE, EX, OF, GEN, CTR	22
4.	TE, N, AX, COX, EX,LE, AK,	1
5.	GEN, CTR, AK, TE, N, AX, COX, LE	10
6.	EX, OF, AK, N, AX, COX	2
7.	LE, EX, AK, COX	3
8.	LE, OF, GEN, TE, N,EX	8
9.	LE, EX, OF, GEN, CTR, AK, TE, N,	9
10.	LE, EX, OF, CTR, AK,	3
11.	AK, N, AX, COX, EX, OF, LE	4
12.	EX, OF, LE	9

Musa *et al.* (2019) reported that the prevalence of 67.7% of *E. coli* was obtained with the highest occurrence of 83.3% in broiler chicks. Hassan and Alireza (2013) observed that the improper selection, indiscriminate use, incorrect duration, improper dose of antibiotics were responsible at farm level for such a higher occurrence of multi drug resistance. Chaudhary *et al*. (2014) claimed that the multi-drug resistance may transfer to consumer via food and leads to serious public health hazard with pathogenic *E. coli* isolates. So while choosing the drugs and formulating the therapeutic decision caution should be taken and the drugs should be subjected to antibiotic sensitivity testing.

Rational use of antibiotics is essential to avoid risk of spreading antibiotic resistance from poultry to humans.

In most countries, worldwide farming is conducted without veterinary supervision, and a wide range of antimicrobials is normally available to farmers "over the counter." Prudent use practices should include restricting the access for use of antimicrobials that are considered to be important for human medicine in animal production. Such restrictions are only currently being enforced only in a number of industrialized countries (Agunos *et al.*, 2012). Anon. (2016) reported that the measures such as education on good farming practices, limiting the availability of antimicrobials, and building up a knowledge base on the AMR profile of poultry pathogens will encourage responsible AMU, contributing to reduce treatment failure of poultry diseases, therefore helping reduce associated economic losses.

SUMMARY

In the field antibiotics were used indiscriminately without veterinary advice. This practice determines the selection of resistant bacteria and the increase in multidrug resistance. In this study we noted the alarming rates for individual and multiple antimicrobial resistance of *E.coli* against the majority of antibiotics which were routinely used in the field level. This causes severe economic losses to the poultry industry, related to high mortality among birds and possesses public health problems. It is necessary to increase efforts to harmonize testing practices, and to promote free access to data on AMR in order to improve treatment guidelines as well as to monitor the evolution of AMR in poultry bacterial pathogens.

Acknowledgement. The authors would like to acknowledge Dean, VC&RI Namakkal for providing facilities for completing this research work.
Conflicts of Interest. None.

REFERENCES

Agunos, A., Leger, D. & Carson, C. (2012). Review of antimicrobial therapy of selected bacterial diseases in broiler chickens in Canada. *Can Vet J., 53*, 1289–300.

Anon. (2016). CVMP Strategy on Antimicrobials *2016-2020* European Medicines Agency.

Bauer, A. W., Kirby, W. M., Sheris, J. C. and Truck, M, (1966). Antibiotic susceptibility testing by a standardized single disk method. T*echnical bulletin of the Registry of Medical Technologists*, *36*(3), 49-52.

Chaudhary, S., Khurana, S. K. & Mane, B. G. (2014). Escherichia coli: animal foods and public health-review. *Journal of Microbiology, Immunology and Biotechnology, 1*, 31-46.

CLSI. Performance Standards for Antimicrobial Susceptibility Testing (2011). Twenty-First Informational Supplement. Vol. 31.Clinical and Laboratory Standards Institute M02-A10 and M07-A08, Wayne, PA.

Edwards, P. R. & Ewing, W. H. (1986). Identification of Enterobacteriaceal. 4th Edition, Burges Publishing Company, Minneapolis, 1, 120-125.

Harry, E. G. & Hemsley, L. A. (1965). The relationship between environmental contamination with septicemia strains of *E. coli* and their occurrences in chickens. *The Veterinary Record, 77*, 241-245.

Hassan, M. & Alireza, J. (2013). Shiga toxin-producing Escherichia coli isolated from chicken meat in Iran: Serogroups, virulence factors, and antimicrobial resistance properties. *Poultry Science, 92*, 1305-1313.

Johnson, J. R., Sannes, M. R., Croy, C., Johnston, B., Clabots, C., Kuskowski, M. A. & Belongia, E. A. (2007). Antimicrobial drug–resistant *Escherichia coli* from humans and poultry products, Minnesota and Wisconsin, 2002–2004. *Emerging Infectious Diseases*, *13*(6), 838-846.

Musa, J. A., Daniel, N., Mohzo, D. L., Bitrus, A. A., Ojo, A. A. & Ezema, K. U. (2019). Extended-spectrum beta-lactamase-producing *Escherichia coli* in chickens from small-scale (backyard) poultry farms in Maiduguri, Nigeria. 2019. *Int J One Health, 5*, 26-30.

Vaillancourt, J. P., Elfadil, A. & Bissailon, J. R. (1992). Cellulitis in poultry, *Canada Poultryman, 79*, 34-37.

How to cite this article: Thangavel Kandasamy (2021). Characterization and Multidrug Resistance pattern of *E.coli*. *Biological Forum – An International Journal*, *13*(2): 772-774.