PREVALENCE OF BACTERIAL RESISTANCE TO QUINOLONES AND OTHER ANTIMICROBIALS AMONG *ESCHERICHIA COLI* STRAINS ISOLATED FROM RETAIL TURKEY MEAT IN AIN EL BAIDA-ALGERIA

MERADI L.¹ and SAADI H.²

1 Laboratory of Microbiology, university Laarbi Ben Mhidi-Oum El Bouaghi, Algéria 2 Saleh Zerdani hospital,Ain El Beida ,Oum El Bouaghi , Algéria

Abstract: Antimicrobial therapy is an important tool in reducing the enormous losses in the poultry industry caused by *Escherichia coli* infections. However, resistance to existing antimicrobials is widespread and of concern to poultry veterinariens. Antimicrobial resistance testing of 18 *E. coli* strains from Retail turkey meat in ain el baida Algeria showed very high levels of resistance to (fluoro) quinolones (66 to 100 %), as these antimicrobial agents may cause cross-resistance with human enteric pathogens, prudent use of them in veterinary medecine is highly recommended.

keywords: Quinolone, Resistance, Escherichia coli, Antibiotics, turkey.

PREVALENCE DE LA RESISTANCE AUX QUINOLONES ET AUX AUTRES ANTIBIOTIQUES DES SOUCHES d'*Escherichia coli* ISOLEES A PARTIR DE LA VIANDE DE DINDE COMMERCIALISEE A AIN EL BEIDA-ALGERIE

Résumé: le traitement antimicrobien est un outil important pour minimiser des énormes pertes en aviculture causées par les infections dues à *Escherichia coli*, cependant ces dernières années le phénomène de l'antibiorésistance a beaucoup pris de l'ampleur en médecine humaine ainsi qu'en médecine vétérinaires. L'étude du profil de résistance de 18 souches d'*Escherichia coli* isolées à partir de la viande de dindes vendue dans la ville d'Ain el baida, Algérie montre un très haut niveau de résistance au antibiotiques, de 66 à 100 % aux (fluoro) quinolones, antibiotique à pouvoir sélectif des mutants résistants très importants, un usage raisonné des antibiotiques en aviculture est recommandé.

Mots clés : Quinolones, Résistance, Escherichia coli, Antibiotiques, Dinde.

Introduction

Antibiotic usage is possibly the most important factor that promotes the emergence, selection and dissemination of antibiotic-resistant micro-organisms in both veterinary and human medicine [1]. In many areas of the world, Large volumes and a wide variety of antimicrobial agents, including fluoroquinolones, are used in food animals (chickens, cattle, fish, and turkeys) [2] [3]. This use of fluoroquinolones has resulted in substantial numbers fluoroquinolone-resistant of bacteria in these animals and in foods

derived from them [4] [5].

A growing number of studies report an association between the emergence of quinolone resistant zoonotic strains, such as Salmonella, *E. coli* and Campylobacter and the subsequent approval and use of these agents in veterinary medicine and as a growth promoter, scientists suggest that such resistant *E. coli_* should be considered a food borne pathogen[6] [7].

Resistant bacteria frequently spread to humans via food, water, direct animal contact, and other pathways.

Although Fluoroquinolone use in food animals has been of particular concern,

because fluoroquinolones are critically important for treating serious infections in humans [2]. In a developing country like Algeria, where antibiotic usage is not strictly controlled, the development of high levels of antibiotic resistance is unavoidable.

The objective of our study was to determine (fluoro) quinolone and other antibiotics resistance frequencies and the level of quinolones resistance in *E. coli* isolates recovered from turkeys retail products in our area (ain el baida).

Retail sampling provides a measure of human exposure to antimicrobial resistant bacteria via undercooked turkeys consumption or cross-contamination with retail poultry products.

1. Material and methods

Turkey samples (cut-up parts), were purchased from different stores located in ain el beida city over the period From 1 march through 15 june 2017; Briefly of each sample 25g was homogenized in 225 mL of Buffered Peptone Water (BPW, 1%), incubated for 6 and 24 hours at 35°C. One milliliter of this rinse was then used to inoculate BLVBT broth. After overnight incubation at 44°C for 24 hours, a loopful from the incubated mix was streaked on Eosin Methylene Blue (EMB) Agar and incubated at 35°C for 24 hours. These primary plates were inspected for colonies of presumptive E. coli, i.e., that were on eosin-methylene blue agar (green and shiny or with dark or purple centers). After urification; each E. coli-like colonial variant were subcultured to a blood agar plate; triple sugar iron agar slant, motility-indole-lysine agar tube, citrate and agar slant. Voges-Proskauer/methyl red tube. Colonies that exhibited reactions consistent with E. coli were defined as *E. coli*, whereas the rare exhibited isolates that questionable reactions were identified by using the API-20E (bio-Merieux). The system antimicrobial resistance of the strains to different antibacterial resistance of the strains to different antibacterial agents was determined by the standard disk diffusion method in in accordance with the NCCLS "National Committee for Clinical Standards"recommendations Laboratory [8]. Minimal inhibitory concentrations of the following (fluoro) quinolones were determined against all nalidixic acid resistant strains: nalidixic acid. Norfloxacin ciprofloxacin, and Levofloxacin; By the agar dilution method following the guideline of the Clinical and Laboratory Standards Institute [8]

2. Results

During the study period, a total of 18 *E. coli* isolates were recovered from all samples; a high frequency of *E. coli* isolation from turkey 's samples : 90%, this was not surprising as *E. coli* is a normal habitant of animal intestine and contamination may occur during evisceration

2.1. Antibiotic susceptibility patterns of Nal resistant *E. coli* isolates

A high antibiotics resistance frequencies were detected in *E. coli* isolates (Table 1); these results could reflect the specific use of antibiotics and quinolones in poultry production.

There was a high resistance frequency, and all the strains present Multi-drug resistance (to at least six antimicrobials). The resistance frequencies (RF) are generally high and permit the division of the division of the antibiotic into two groups.

The first group includes the antibiotics to which there where very high levels of resisance (RF from 66 to 100 %); these are Ampicillin, Amoxicillin-clavulanic acid, Tetracycline, Rifampicin, Trimethoprimsulmethoxazole and the three quinolones assayed (Nalidixic acid, Ofloxacin and Pefloxacin).

The second group includes the antibiotics to which there were medium to low levels of resistance (0 to 33), these are Cefotaxime and Gentamycin.

In Algeria, even the interdiction of antibiotic use as a food additive, we found that the producers continue the use of different antibiotics, specially (fluoro) quinolones (Flumequine, Enrofloxacin and Norfloxacin) for growth promotion and Prevention of diseases. in poultry production; this finding may explain the high prevalence of quinolone resistance among avian strains (Fluoro) quinolonesresistant avian E.coli isolates has been reported in other places

Table 1 - Antibio	tic resistance	of Escherichia	coli strains
-------------------	----------------	----------------	--------------

Antibiotic	% of resistance	
Ampicillin	83.33	
Amoxicillin-clavulanic acid	94.44	
Cefotaxime	5	
Gentamycin	33.33	
Tetracycline	100	
Trimethoprimsulmethoxazole	94.44	
Rifampicin	100	
Nalidixic acid	100	
Ofloxacin	66.67	
Pefloxacin	88.88	

2.2 The minimal inhibition concentration « MIC » determination of quinolones:

The results of CMI determination are presented in table 2.

Table 2 - Distribution of (fluoro) quinolones MICs for nalidixic acid resistant strains of *Escherichia coli*

Antibiotic	MIC(µg/ml)	Number of strains
	32	0
	64	0
	128	0
Nalidixic acid	256	0
	>256	18

Norfloxacin	1 2 4 8 >8	3 4 1 5 5
Ciprofloxacin	1 2 4 8 ≻ 8	3 3 4 3 5
Levofloxacin	1 2 4 8 > 8	3 5 3 3 4

Strains shown a high level of résistance for all quinolones, all strains presented a very high resistance level to nalidixic acid, MIC> 256 μ g/ml and also; there was 5 strains presenting a MIC >8 μ g/ml to Norfloxacin and Ciprofloxacin then for levofloxacine (third generation),there was four strains presenting a MIC >8 μ g/ml

3. Discussions

In this study we examined quinolones resistance of *E. coli* isolates recovered from turkey retail meat.

The level of quinolone resistance depends on the molecular mechanism responsible of this resistance; previous studies indicate that there is a correlation between the number of changes in the QRDR (quinolone resistance determing region) of GyrA and ParC proteins and the level of quinolone resistance of the *E. coli* strains,

Scientist suggested that the high prevalence of quinolone resistant *E. coli* in the stools of healthy humans in their area (Barcelona, Spain) could be linked to the

high prevalence of resistant isolates in poultry and pork [1].

These results reinforce the need to monitor quinolone resistant bacteria in animal production as their emergence is an important threat to human health.

Thus, the multiple drug-resistant *E. coli* strains found in this study is of public health concern. This multiple antimicrobial resistances may result from the spread of genetic elements including plasmids, transposons, and integrons **[9]**, also some bacterial resistance mechanisms may confer resistance to more than one agent, efflux pumps exemplify this principle. These findings should reinforce the message that the continued surveillance of

emerging of antimicrobial resistance among E. coli strains in food production is needed to assure public health. To deal with multi-drug resistant organisms, it is usually recommended that potentially synergistic antimicrobial combination be used. preventive strategies. such as appropriate husbandry and hygiene, routine and immunization. health monitoring. should be emphazed.

The veterinarian and farmer should work closely when antibiotic therapy is needed in animals, and both must continue to work toward ensuring a safe food supply for consumer.

Conclusion

The present report demonstrates a high prevalence of resistant *Escherichia coli* in raw turkey meat. These isolates are commonly resistant to different classes of antibiotics, including those that are critically important for humans. These results highlight the importance of consumer awareness of safe handling and cooking of turkey meat.

The routine screening of antimicrobial resistance among foodborne pathogenic and commensal organisms from such commodities is of great importance to help identify and manage the emerging resistance problem in the food supply.

References bibliographiques:

[1] Witte W., 1998 -Medical consequences of antibiotic use in agriculture. Science, 279: 996-997

[2] First Joint WHO /OIE/ FAO, 2003 -Expert Workshop on Non-Human Antimicrobial Usage and Antimicrobial Resistance. Scientific assessment, Geneva,1-5 December 2003.

[3] Mellon M, Fondriest S. Hogging it., 2000 - estimates of antimicrobial abuse in livestock. Union of Concerned Scientists, Cambridge, MA.2000

[4] Johnson JR, Murray AC, Gajewski A, 2003 - Isolation and molecular characterization of nalidixic acid-resistant extraintestinal pathogenic *Escherichia coli* from retail chicken products.Antimicrob Agents Chemother ; 47: 2161–8.

[5] US Food and Drug Administration, 2000 - Final decision of the commissioner: proposal to withdraw the approval of the new animal drug application for enrofloxacin for poultry.Docket .N-1571.

[6] Johnson JR, Kuskowski MA, Menard M, Gajewski A, Xercavins M, Garau J., 2006 - Similarity of human and chicken *Escherichia coli* isolates with relation to ciprofloxacin resistance status. J Infect Dis, 194:71–8.

[7] Lautenbach E, Fishman NO, Metlay JP, 2006 - Phenotypic and genotypic characterization of fecal *Escherichia coli* isolates with decreased susceptibility to fluoroquinolones: results from a large hospital-based surveillance initiative.

J .Infect Dis, 194:79-85.

[8] NCCLS, 2004.- Performance Standards for Antimicrobial Susceptibility Testing. NCCLS document M100-S14. National Committee for Clinical Laboratory Standards, Wayne, PA.

[9]- Zhao S., White D.G., Ge B., Ayers S., Friedman S., English L., Wagner D., Gaines S. and Meng J., 2001 -Identification and characterization of integron-mediated antibiotic resistance among Shiga toxin-producing *Escherichia coli* isolates, Applied and Environmental Microbiology, 67: 1558–1564