

ANTIBIOTIC SUSCEPTIBILITY OF *E. COLI* O157:H7 ISOLATED FROM BEEFBURGER

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إن استعمال الاطعمة الجاهزة وخاصة الهامبورجر البقري قد يؤدي إلى الإصابة ببكتريا معوية (قولونية) عسوية تسمى *E. coli* التي تؤدي إلى حالات خطيرة مثل الالتهابات القولونية المدممة ، متلازمة بولية ونقص في الصفائح الدموية. وللأسف فإن مقاومة هذه البكتريا للمضادات الحيوية في ازدياد. في هذه الدراسة تمت تجربة مدي إستجابة البكتريا المعوية (القولونية) العسوية المعزولة من الهامبورجر والتي تم الكشف عنها بواسطة الـ PCR وأظهرت النتائج مقاومة هذه البكتريا لجميع المضادات الحيوية المستخدمة في البحث ماعدا دواء دانوفلوكساسين. لذلك توصي الدراسة بإمكانية استخدام عقار دانوفلوكساسين لعلاج العدوي بهذا النوع من البكتريا المنقول من الهامبورجر .

E. coli transmitted from under-cooked hamburger may cause life threatening condition including hemorrhagic colitis, hemolytic uremic syndrome and thrombotic-thrombocytopenic purpura. Unfortunately, the emergence of resistance has become increased. Therefore, the antimicrobial susceptibility of the causative strain *E. coli* "O₁₅₇:H₇" was determined in this study. Results showed that *E. coli* O₁₅₇:H₇ was resistant to all tested antibiotics except danofloxacin. Therefore, this study recommend the use of danofloxacin in controlling infections caused by *E. coli* transmitted from hamburger.

INTRODUCTION

E. coli O₁₅₇:H₇ attracted attention not only because food-borne transmission is more common, but also because it can cause life-threatening conditions, hemorrhagic colitis (HC) [inflammation of the

colon with bleeding], hemolytic uremic syndrome (HUS) [blood in the urine, kidney failure] and thrombotic thrombocytopenic purpura (TTP) [loss of blood platelets]¹. The majority of outbreaks have resulted from the transmission of the organism through the consumption of beef,

most commonly, under-cooked contaminated ground beef (specially hamburger) thus, the term Hamburger Disease^{2&3}. Ruminants are important reservoirs for *E. coli* O₁₅₇:H₇⁴.

The emergence of antibiotic resistance among important food-borne pathogens like *E. coli* O₁₅₇:H₇ has become an important issue with regard to food safety. Epidemiological studies suggest an association between the use of antibiotics in animals and the isolation of resistant bacteria from the same animals⁵. A further complication is the isolation of *E. coli* O₁₅₇:H₇ strains exhibiting resistance of commonly used antibiotics⁶.

However, recent studies have revealed a trend toward increased resistance to commonly used antibiotics. For example, of 56 *E. coli* O₁₅₇:H₇ isolates collected between 1984 and 1987, all were susceptible to the antibiotics tested; however, 13 of 176 isolates (7.4%) isolated between 1989 and 1991 were resistant to streptomycin, sulfisoxazole and tetracycline⁶.

Meng *et al.*⁷ reported that *E. coli* O₁₅₇:H₇ and O₁₅₇:NM have developed resistance to antibiotics (streptomycin, sulfisoxazole and tetracycline) and they concluded that research was needed to define mechanisms of antibiotic resistance in *E. coli* O₁₅₇:H₇ and to minimize the development of resistant.

E. coli O₁₅₇ isolates revealed high rate of resistance to Benzyl penicillin, sulphaquinoxalin,

spectinomycin and combination of kitassamycin & amoxicillin⁸.

Antimicrobial resistance is one of the main concerns for health professionals dealing with bacterial disease. The current trend worldwide is to reduce antibiotic use in animal production in favor of good husbandry practices and vaccination, as means to raise healthier animals.

MATERIALS AND METHODS

Bacterial strain

E. coli O₁₅₇:H₇ strain that isolated from beefburger sample and identified by PCR assay.

Antibiotic sensitivity test was carried out according to Piddock⁹.

The following antibiotic discs were tested: Amikine (AK) 30 ug, Amoxil (AMX) 25 ug, Ampicillin (AM) 10 ug, Cefobid (CFP) 75 ug, Cefoperazone (CFP) 75 ug, Cefotaxime (CTX) 30 ug, Cephalotin (CF) 30 ug, Chloramphenicol (C) 30 ug, Danofloxacin (DFX) 5 ug, Doxycycline (D) 30 ug, Erythromycin (E) 15 ug, Garamycin (GM) 10ug, Oxytetracycline (OT) 30 ug, Penicillin (P) 10 ug, Polymexin B (PB) 300 ug, Rimactan (rifampicin) (Rfa) 30 ug, Sulphamethoxazole (SX) 30 ug, Sulphamethazole/trimethoprim (SXT) 25 ug, Tetracycline (TE) 30 ug, TrimethoprimTM 5 ug.

For sensitivity testing, nutrient agar plates not less than 3mm in thickness were inoculated uniformly by (1x10⁷ cfu/ml agar) from overnight broth cultures. The plates were then

allowed to dry in inverted position in the incubator at 37°C/30 min. Subsequently the antibiotic discs were placed on the surface of the agar using sterile forceps, with a distance of a few centimeters in between. After overnight incubation of the

plates at 37°C, the total diameter of the zone of inhibition was measured using a caliper. The antibiotics were classified into resistant, intermediate and susceptible according to the manufacture directions.

RESULTS

Table 1: Antimicrobial susceptibility determinations of *E. coli* O₁₅₇:H₇.

Antibiotic	Disc concn	Inhibition zone diameters		
		Resistant	Intermediate	Susceptible
Amikine (AK)	30 ug	+	-	-
Amoxil (AMX)	25 ug	+	-	-
Ampicillin (AM)	10 ug	+	-	-
Cefobid (CFP)	75 ug	+	-	-
Cefoperazone (CFP)	75 ug	+	-	-
Cefotaxime (CTX)	30 ug	+	-	-
Cephalotin (CF)	30 ug	+	-	-
Chloramfhenicol (C)	30 ug	+	-	-
Danofloxacin (DFX)	5 ug	-	-	+
Doxycycline (D)	30 ug	+	-	-
Erythromycin (E)	15 ug	+	-	-
Garamycin (GM)	10 ug	+	-	-
Oxytetracycline (OT)	30 ug	+	-	-
Penicillin (P)	10 ug	+	-	-
Polymexin B (PB)	300 ug	+	-	-
Rimactan (rifampiicin) (Rfa)	30 ug	+	-	-
Sulphamethaxozole (SX)	30 ug	+	-	-
Sulphamethazole/trimethoprim (SXT)	25 ug	+	-	-
Tetracycline (TE)	30 ug	+	-	-
Trimethoprim TM	5 ug	+	-	-

DISCUSSION

Drug resistance was detected in *E. coli* 0157:H7 (Table 1). The results of this study revealed that *E. coli* 0157:H7 was resistant to all tested antibiotics except Danofloxacin. These obtained results were in agreement with most studies and reports which emphasized on the development of antimicrobial resistant of *E. coli* 0157:H7⁵⁻⁸.

The data show that Danofloxacin (DFX) should be effective in control of *E. coli* 0157:H7 as it gives very large inhibition zone (32 mm).

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