

Detection the Serogroups of *Escherichia coli* isolates from Urine sample of UTI patients

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Aims: Determining of *E.coli* serogroups which isolation from UTI patients

Patients and Methods: the study was conducted between September 2019 to April 2020 and they was collected 40 sample from patient how are diagnosis with UTI during this study .

Results: From the UTI patients individuals, 40 strains were identified in which O serogroups showed 8(30%) and 2 (20%), respectively, of occurrence in those strains. Moreover, the enterohemorrhagic *E. coli* (O157 H7) and the enteroaggregative *E. coli* (O44 H7) were detected in two strains of the UTI-based urine samples only. For the antibiotic resistance properties of the biofilm positive producers isolated from the UTI urine samples, multidrug resistance was revealed in 60% of those isolates; however, only 20% of the biofilm negative producers from the UTI urine samples showed the MDR characteristics. Biofilm was identified in 75% of the UTI urine. For the antibiotic sensitivity test, the results demonstrated that the sensitivity rates to Imipenem, Amikaci, gentamicin, and tobramycin were 90%, 100%, 65%, and 40%, respectively, in the UTI strains.

Conclusion: The herein study provides thorough data about the *Escherichia coli* based biofilm,

Keywords: Biofilm, *E. coli*, UTIs, Resistance of antibiotics, uro-pathogenic *Escherichia coli*.

Introduction

Escherichia coli is a well-known resident of the human and animal gastrointestinal system. *E. Coli* establishes a significant symbiotic connection together with its habitat, performs a significant act in encouraging the stabilization and maintenance of ordinary gastrointestinal homeostasis of the macrobiotic. For the commensal property, *E. coli* is contained in the gastrointestinal tract causing illnesses only in occasion cases. However, even *E. coli* of non-pathogenic-commensal natures can induce illnesses in immunosuppressed or in the GIT-barrier-based defected patients¹ Virulence factors are acquired by these strains playing very important roles in providing these bacteria with specific properties to perform intestinal-niche-based adaptation and generate illnesses. These properties are obtained by the bacteria via genetic materials transferring for other bacteria or environment such plasmids, horizontal gene transfer, and/or bacteriophages. *E. coli* can generally be categorized into enteric/diarrhegenic *E. coli* or extra intestinal *E. coli* . More specifically, *E. coli* can be classified into

six “pathotypes” of enterohemorrhagic *E. coli* (EHEC), enteropathogenic *E. coli* (EPEC), entero aggregative *E. coli* (EAEC), enterotoxigenic *E. coli* (ETEC), diffusely adherent *E.Coli* (DAEC), and enteroinvasive *E. coli* (EIEC)².

One of the more often recognized infections in humans caused by uropathogenic *Escherichia coli* (UPEC) are urinary tract infections (UTI) that include pyelonephritis and cystitis. The UTIs can rely on various factors such as host immune responses, anatomical properties, and the bacterial virulence. For the *E. coli* to induce an infection, the bacterium has to have the abilities performing host-cell-related adhesion, tissue bacterial colonization, intracellular invasion (in some bacteria), bacterial proliferation, and blood-dependent dissemination to different body systems. Bacteria can be present in the urine as a result to colonization generating no symptoms as it is named asymptomatic bacteriuria³. Asymptomatic bacteriuria based illnesses may not require medical attention, in fact, it can provide the immune system with proper defense mechanisms

against other strains of *E. coli* ⁴.UTI treatment with antibiotics can be successful; however, the problem of resistance by the bacteria to antibiotics is increasing leading to recurrent occurrence of the UTIs especially in the presence of biofilm formation and virulence factors⁵

The aim of this study is determination of serogroups of *E.coli* which are isolated from UTI patient.

Patients and collecting samples

There were 150 urine samples were collected from patients with the symptoms of urinary tract infection who had been admitted at Al-Yarmouk teaching hospital in Sept 2019 till April 2020. To confirm infection with *E. coli*, the samples were cultured in the EMB Agar and Blood Agar and were identified by the Gram stain, Indole test, and Citrate and MR-VP tests. The laboratory criteria of acute urinary tract infection with *E. coli* included one positive culture of colonies with a minimum number of 10⁵ colonies per 1 ml of urine collected in the urology department of Al Yarmouk teaching hospital in Baghdad between September 2019 till April 2020.

Serotyping

According to Liu et al ,2015 .The test included O and H antigenic based identification using an antibody (polyvalent and monovalent)-detected agglutination test. The test was performed using methods concluded from.⁶

Antibiotic sensitivity test

The antibiotic sensitivity test depended on Kirby

Bauer disc diffusion method.

Biofilm formation

According to Nourbakhsh *et al* ,2016 the ability of *E. coli* isolates to produce biofilms, biofilm test was performed in laboratory based on the Micro titer Plates Assay as follow as:

The micro titer plate method was used for evaluating the formation of UPEC biofilm. The Micro titer Plates Assay method, such as ELISA, the color-producing chromogenic in this technique is fuchsin, whose color intensity is directly related to the concentration of biofilm ⁷.

Statistics

BM SPSS software v20.0. (Armonk, NY: IBM Corp) was used to process the observed data. Chi-square and Fisher’s exact tests were performed. Data, sometimes, were displayed as numbers and percentages (%). The null hypothesis was not followed when *p* is less than 5%.

Results

Serotyping

From the UTI patients and healthy individuals, 40 and 20 strains, respectively, were identified in which O serogroups showed 7 (35%) and 3 (15%), respectively, of occurrence in those strains. Moreover, the enterohemorrhagic *E. coli* (O157 H7) and the enteroaggregative *E. coli* (O44 H7) were detected in two strains of the UTI-based urine samples only, figure 1

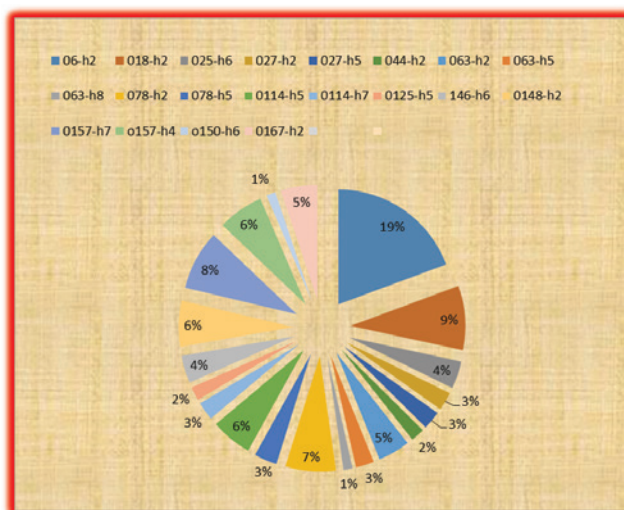


Figure 1: Total of serotype percentages of *E.coli* isolation from UTI patient

Antibiotic sensitivity test

For the antibiotic resistance properties of the biofilm positive producers (BPPs) isolated from the UTI urine samples, multidrug resistance (MDR) was revealed in 60% of those isolates; however, only 20% of the biofilm negative producers (BNPs) from the UTI urine samples showed the MDR characteristics. For the antibiotic sensitivity test, the results demonstrated that the sensitivity rates to imipenem, amikacin, gentamicin, and tobramycin were 90%, 100%, 65%, and 40%, respectively, in the UTI strains, figure 2

Discussion

UTIs are well-known cases of illnesses with high incidence rates in humans, and UPEC plays an important role in the etiology of these infections⁸. For those bacteria, a wide range of virulence factors are considered as critical components of the UPEC providing those strains with different capabilities such as adherence to the host cells enhanced by some factors; for example: adhesins that play huge roles in bacterial attachment to epithelial cells of the urinary system⁹

For the O serogroup, UPEC-associated O-serogroups were detected in high rates, 60%¹⁰. The current work revealed that 2 (10%) of the strains isolated from the urine samples were not placed in a certain serogroup. This agrees with¹¹ who found that in their results about (28%) of their strains were unidentified in a certain serogroup.¹² have also found that 25.5% of their recognized strains were from unknown serogroups. Moreover, Gilbert NM, Lewis AL,²¹⁰⁹ observed the same rate, 25%, of the unidentifiable strains.¹³

Moreover, the enterohemorrhagic *E. coli* (O157 H7) and the enteroaggregative *E. coli* (O44 H7) were detected in two strains of the UTI-based urine samples only. This was also reported by¹⁴ who found that strains of UPEC from UTIs but not the stool were able to produce UTIs in murine¹⁵.

For biofilm formation, this bacterial mechanism is considered as a defense strategy to defeat body boundaries and escape body immune system components. The biofilm was recognized in human infections in a rate of 60%¹⁶.

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Conflict of Interest -nil

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