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# Isolation Of Microorganisms Associated With Urinary Tract Infection In Diabetic Patients In Libya And Their Antibotic Susceptibility Pattern

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## Abstract

Urinary tract infection is a serious health problem especially in diabetic patients.The aim of our study was to isolate the microorganisms associated with urinary tract infection in diabetic patients and to determine their antibiotic susceptibility pattern. Our study was carried on seventy eight diabetic patients, dependent and undependent on insulin. They were from different age groups ranged from 30-70 years of males and 35-60 years of females. Urinary samples were collected from these groups and urine examination culture and biochemical reactions were performed to detect different organisms causing urinary tract infection. Also antibiotic sensitivity test was performed to detect the most sensitive antibiotic against these organisms. We detected fifty patients out of seventy eight had urinary tract infection. The most common organisms detected were identified as **Escherichia coli, Klebsiella aerogense** and **Pseudomonas aeroginosa.** Also we found that the most sensitive antibiotic were nitrofurrantion (68%) followed by noroxin (60%) septrin sulfatrimero (30%), cephradine (28%), ampicillin (24%) and amikin (20%).

## Introduction

Urinary tract infection is a serious public health problem, in general practice 12 from 1000 consultations are suffer from urinary tract infection. Also the statistics reveals an increase deaths from infection of the kidney (Asscher and Finkle, 1998). Kass (1998) reported that there are difficulties in the management of these infections. Chodirker *et al.* (1996) found that human urine lacks both humoral and cellular defensive mechanisms against bacterial invasion, whereas tears, saliva and bronchial secretions contain lysozyme.

A urinary tract infection (UTI) is a condition where one or more structures in the urinary tract becomes infected after bacteria overcome its strong natural defenses. In spite of these defenses, UTIs are the most common of all infections and can occur at any time in the life of an individual. Almost 95% of cases of UTIs are caused by bacteria that typically multiply at the opening of the urethra and travel up to the bladder. Much less often, bacteria spread to the kidney from the blood stream (Valkenburg, 1993).

In a study of aerobic culture of 1281 urine samples sent from the out patients as well as inpatient department of the SMHS hospital to the microbiology laboratory of the Govt. medical college in England (Strinager ,1997). The pathological microbes isolated from patients samples were identified as. *E.coli, Klebsiella* and also *Pseudomonas*. sp. They found that each of them was sensitive to most of antibiotics but with different percentages. Presence of increased amounts of glucose in the urine resulting in more rapid multiplication of bacteria (Asscher *et al.*, 1999), on other words, the presence of glucose in the urine provides a better medium for multiplication of *E.coli*. This may be a factor in the severity of urinary tract infection in diabetics.

Dyer and Cotchin (1999), studied the microorganisms which cause urinary tract infection in diabetic patients which was very important and found how they can be treated using antibiotics such as nitrofurrantion, amikin, noroxin, septrin sulfatrimero, ampicillin, cephradine. Undoubtedly, frequencies and antibiotic patients of resistant bacteria in various countries are defendant upon the amount and kind of antibiotics being used (Ross *et al.*, 1972 and

Toama *et al.*, 1983). The most contributing factors for developing resistance were the excessive use and or abuse of antibiotics, both used as growth promoters in animal feeds and fat treatment and prophylaxis in humans and veterinary medicines (WHO, 1980 and Ryder *et al.*, 1980).

The present investigation aimed to isolate and characterize the different organisms which are responsible for urinary tract infection in diabetic patient and to recognize most susceptible antibiotic used for treatment of these bacteria.

## Material And Methods

***Isolation of selected organisms:***

Seventy eight diabetic patients were enrolled in this study, forty patients were insulin dependent and thirty eight patients were insulin independent. All these cases were suffering from urinary troubles, with the exception of six cases have no symptoms. All these patients were attending the outpatient clinic of Alzahra Hospital at Libya.

All the previous cases were subguided to the following:

**- Collection of the urine:**

To avoid contamination all patients were instructed how to collect clean mid-stream urine in a clean sterile test tube, external urinary organs were cleaned with water and disinfected by detol or alcohol before taking the samples. The urine samples were examined immediatly.

***Examination of urine:***

Urine samples collected from patients were centrifuged and cultured on nutrient agar media according to (Collee and Marr, 1989) and MacConkey's media (Sonnen-wirth, 1980).

**(1) Microscopical examination:**

Half of one colony was taken by a sterile loop and spreaded over a slide and stained by Grams stain. Microscopical examination of the stained film was done to detect Gram – ve or +ve bacteria (Robert *et al.*, 1991).

**(2) Coliform organisms:**

Tested organisms were primary suspected on the bases of the shape and morphology of the rose pink colonies on MacConkey's medium and were further identified by its biochemical reaction.

*E.coli, K. aerogense and P. aeroginosa* were isolated from urine specimens and identified morphologically and biochemically by the conventional tests recommended by many investigators (Jawetz *et al.*, 1980). In the absence of distinctive clinical features, diagnosis of *K. aerogense* infection should be based on the isolation of the organism from the urine (Blasser *et al.*, 1982). In addition the absolute diagnosis of *P.aeroginosa* is achieved by isolation of the organism from the urine (Mata *et al.*, 1969).

***Effect of different antibiotics on pathogenic isolates***

Different common antibiotics were used to show their effect on the isolated pathogenic bacterial organisms causing urinary tract infection in diabetic urine collected samples. The antibiotics used were cephradine (10μg), ampicillin (25 μg), septrin sulfatrimero (25μg), noroxin (10 μg), amikin (10 μg) and nitrofurrantion (30 μg) using standardized disc diffusion method, which was done as described by Bauer *et al.* (1986).

***Determination of the minimum inhibitory concentration (MICs) and minimum bactericidal concentrations (MBCs) of different antibiotics against selected isolates.***

The antibiotic that were tested by this method against different strains ( *E.coli, Klebseilla* and *Pseudomonas)* included (Noroxin, Amikin, Nitrofurrantion and cephradine ).

The stock solution of the four selected antibiotics was prepared to the concentration of 100/1 μg/ml. Each antibiotic suspension was diluted with sterile distilled water to obtain 1 μg/ml final concentration. This solution was prepared freshly for every experiment. All the tubes were incubated at 37°C for 24 hours and examined for turbidity as an indicator for bacterial growth (Lowry, 1975). Data were recorded and analyzed using SPSS 6.0 software for statistical analysis.

## Results

**(1) Isolation of the microorganisms:**

Results showed that 50 out of 78 samples of them were positive for the presence of *E.coli, K. aerogense and P. aeroginosa* and twenty eight samples were negative for E. *coli, K. aerogense and P. aeroginosa*. The highest percentage rate obtained was 85.71% of positive samples found in male aged from 61-70 years and the highest percentage rate of female samples reach to 83.33% at ages 46-50 years as illustrated in table (1).

Statistical analysis of results showed in table (2) revealed that there are significant correlation between the age of patients, sexes (male and female) and personal state and urinary tract infection, but these results were not significant with insulin dependence.

**(2) Identification of bacterial isolates:**

Three bacterial species *E. coli* or *K.,aerogense* and *P. aeroginosa* were isolated from urine samples of diabetes mellitus.

The clinical isolates were subjected to two patterns of identification according to the Bergey's manual of determinative bacteriology (1989).

**(3) The distribution of pathogenic isolate from positive urine samples:**

Results in table (3) indicate that the number of infected positive diabetic urine samples collected from males and females were 29 samples infected with *E.coli, 13 of K.aerogense and 8 of P.aeroginosa* strains from positive collected samples. The highest percentage of distribution were found in E.coli (58%) followed by *K.aerogense* (26%) and *P.aeroginosa* (16%).

**(4) Effect of different antibiotics on pathogenic isolates:**

The results in table (4) revealed that the six isolates of *E.coli* were sensitive to cephradine, five isolates were sensitive to ampicillin, six isolates sensitive to septrin sulfatrimero, seventeen isolates sensitive to noroxin, five isolates were sensitive to amikin, twenty four isolates were sensitive to nitofurrantion. The *E.coli* isolate numerated as fourty four was more sensitive to nitrofurrantion and *E.coli* isolate numerated five is more resistant to ampicillin and amakin, the same results indicate that the seven isolates of *K.aerogense* were sensitive to cephradine, five were sensitive to ampicillin, nine were sensitive to septrin sulfatrimero, nine were sensitive to noroxin, five were sensitive to amikin, six were sensitive to nitrofurrantion.

These results also revealed that the two isolates of *P.aeroginosa* were sensitive to cephradine, two were sensitive to ampicillin, one was sensitive to septrin sulfatrimero, four were sensitive to noroxin, three was sensitive to nitrofurrantion and the *P.aeroginosa* numerated as twenty four was more sensitive to noroxin.

***Sensitivity test of pathogenic isolates against different tested antibiotics:***

The sensitivity test of pathogenic bacterial isolates against different tested antibiotic were illustrated in table (5). These results showed that the antibiotic nitrofurrantion was more effective against isolated pathogenic bacterial organisms (E.coli, K. aerogense and P. aeroginosa which the percentage of sensitive organism reach to 68% followed by noroxin 60%, septrin sulfatrimero 30%, cephradine 28%, ampicillin 24 % and amikin 20%.

***Statistical analysis of sensitive and resistance pathogenic isolates against different antibiotics:***

The results in table (6 a,b,c,d,e and f) showed that the sensitivity of each pathogenic bacterial isolate against each tested antibiotic to illustrate the obtained results were significant or not, all obtained results were significant and the percentage of sensitivity test against antibiotic nitofurrantion reach to maximum value with *E.coli* (55.9%) more than *K.aerogense* (23.5%) and *P.aeroginosa* (20.6%), the same results were obtained with noroxin antibiotic. Antibiotic septrin sulfatrimero and cephradine were more effective in *E.coli* (60 % and 50 % respectively) more than *K.aerogense* (33.3% and 35% respectively) and *P.aeroginosa*(6.7% and 14.3% respectively).

***Determination of minimum inhibitory concentrations (MIC) and minimum bactericidal concentrations (MBC) of some antibiotics:***

The experimental bacteria were treated separately with different concentration of the antibiotics under test in nutrient broth and on solid agar medium and the MICs and the MBCs were determined.

The obtained data recorded in table (7) revealed that the MICs of amikin (250µg/ml) more than MICs if birixub (125µg/ml) and nitrofurration (31.25µg/ml) and cephradine (15.63 µg/ml) for *P. aeroginose, K. aerogense* and *E.coli* respectively. MBCs of amikin, noroxin and nitrofurrantion (250µg/ml) more than cephredine (125µg/ml) for *K.aerogense, p.aeroginosa* and *E.coli.*

**Table (1): Diabetic urine samples collected from different ages of male and female (positive samples infected with *E.coli* or *K. aerogense, P. aeroginosa*) Patients**

| Source of sample | Total samples | Positive samples | Percentage (%) | insulin Dependence | | Marital states | |
|---|---|---|---|---|---|---|---|
| | | | | Dependent | Independent | Single | Married |
| Age of males (years) | | | | | | | |
| 30-35 | 12 | 7 | 58.33 | 3 | 9 | 2 | 10 |
| 36-40 | 8 | 5 | 62.50 | 2 | 6 | 3 | 5 |
| 41-45 | 3 | 1 | 33.33 | 1 | 2 | - | 3 |
| 46-50 | 6 | 5 | 66.66 | 3 | 3 | 2 | 4 |
| 51-55 | 5 | 4 | 80.00 | 2 | 3 | - | 5 |
| 56-60 | 7 | 5 | 71.42 | 3 | 4 | 1 | 6 |
| 61-70 | 7 | 6 | 85.71 | 2 | 5 | - | 7 |
| Age of females (years) | | | | | | | |
| 35-40 | 8 | 3 | 37.5 | 3 | 5 | 2 | 6 |
| 41-45 | 5 | 2 | 40 | 3 | 2 | 1 | 4 |
| 46-50 | 6 | 5 | 83.33 | 2 | 4 | - | 6 |
| 51-55 | 4 | 3 | 75 | - | 4 | - | 4 |
| 56-60 | 7 | 4 | 57.14 | - | 7 | - | 7 |
| | 78 | 50 | | | | | |

**Table (2): Statistical analysis and characteristics of the studied groups.**

| *Character* | *Positive samples* | | *Negative samples* | | *Test of significant* | *P* |
|---|---|---|---|---|---|---|
| Age<br>$\overline{X} \pm$ SD<br>Range | 51.2 ±10.3<br>40.9-61.5 | | 48.5 ± 11.2<br>37.3-59.7 | | T<br>1.08 | 0.28<br>NS |
| Gender | NO | % | No | % | $X^2$ | P |
| Male<br>Female | 32<br>18 | 46.0<br>36.0 | 19<br>9 | 67.9<br>32.1 | 0.12 | 0.73<br>NS |
| Social status<br>Lower<br>Middle | <br>24<br>26 | <br>48.0<br>52.0 | <br>9<br>19 | <br>32.1<br>67.9 | <br>1.85 | <br>0.17<br>NS |
| Marital status<br>Single<br>Married | <br>12<br>38 | <br>24.0<br>79.0 | <br>6<br>22 | <br>21.4<br>78.6 | <br>0.07 | <br>0.79<br>NS |
| Insulin<br>+ve<br>-ve | <br>35<br>15 | <br>70.0<br>30.0 | <br>20<br>8 | <br>71.4<br>28.6 | <br>0.02 | <br>0.89<br>NS |

No = Number
$X^2$ = Test of significance (Chi – square)
P= probability
P>0.05 = Non significant

P< 0.05 = Significant
P< 0.01 = Highly significant
NS= Non significant
T = test of significant

**Table (3): The numerical distribution of pathogenic bacterial isolates from positive collected samples**

| Pathogenic bacterial isolate | Total samples | Positive samples | Percentage positive | Distribution | | | |
|---|---|---|---|---|---|---|---|
| | | | | Male | % | Female | % |
| *E. coli* | 50 | 29 | 58 | 21 | 65.6 | 8 | 44.4 |
| *K. aerogenes* | 50 | 13 | 26 | 11 | 34.32 | 2 | 11.1 |
| *P. aeruginosae* | 50 | 8 | 16 | 5 | 15.61 | 3 | 16.6 |

**Percentage of distribution** = $\frac{positive\ samples}{Total\ samples} X100$

**Table (4): Inhibition zone (mm) of different pathogenic bacterial isolates against different tested antibiotics.**

| *No* | *Pathogenic Isolates* | *Cephradine (10 µg)* | | *Ampicillin (25µg)* | | *Septrin sulfatrimero (25µg)* | | *Noroxin (10µg)* | | *Amakin (10µg)* | | *Nitrofurran-tion (30µg)* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | IZ | S | IZ | S | IZ | S | IZ | S | IZ | S | IZ | S |
| 1 | **E.coli** | 19 | S | 20 | S | 12 | R | 12 | R | 12 | R | 20 | S |
| 2 | *E.coli* | 14 | S | 11 | R | 9 | R | 30 | S | 12 | R | 20 | S |
| 3 | *k.aerogense* | 24 | S | 32 | S | 30 | S | 32 | S | 8 | R | 12 | R |
| 4 | *E.coli* | 10 | R | ND | | 11 | R | 29 | S | 12 | R | 18 | S |
| 5 | *E.coli* | 11 | R | ND | | 12 | R | 11 | R | ND | | 20 | S |
| 6 | *P.aeroginosa* | 19 | S | 20 | S | 11 | R | 30 | S | 10 | R | 20 | S |
| 7 | **P.aeroginosa** | ND | | ND | | ND | | 30 | S | 11 | R | ND | |
| 8 | *K.aerogense* | ND | | ND | | 32 | S | 10 | R | 9 | R | 21 | S |
| 9 | *E.coli* | 12 | R | 13 | R | 8 | R | 30 | S | ND | | 20 | S |
| 10 | *K.aerogense* | 12 | R | 12 | R | 11 | R | 32 | S | ND | | 10 | R |
| 11 | *E.coli* | 16 | S | 8 | R | 11 | R | 9 | R | 12 | R | 21 | S |
| 12 | **P.aeroginosaenes** | 11 | R | 18 | S | 29 | S | 30 | S | ND | | 21 | S |
| 13 | *E.coli* | 12 | R | 12 | R | 29 | S | 12 | R | 11 | R | 19 | S |
| 14 | *K.aerogense* | 8 | R | 10 | R | 30 | S | 30 | S | 31 | S | 20 | S |
| 15 | *E.coli* | 11 | R | 11 | R | 12 | R | 11 | R | 10 | R | 19 | S |
| 16 | *E.coli* | 12 | R | 8 | R | 12 | R | 30 | S | ND | | 21 | S |
| 17 | *K.aerogense* | 16 | S | 12 | R | 8 | R | 30 | S | ND | | 11 | R |
| 18 | **P.aeroginosa** | ND | | ND | | ND | | 11 | R | 12 | R | ND | |
| 19 | *E.coli* | 11 | R | 13 | S | 11 | R | 8 | R | 11 | R | 20 | S |
| 20 | *K.aerogense* | 10 | R | 22 | S | 30 | S | 10 | R | 10 | R | 20 | S |
| 21 | *E.coli* | ND | | ND | | ND | | ND | | 10 | R | ND | |
| 22 | *E.coli* | 11 | R | ND | | 12 | R | 30 | S | 12 | R | 20 | S |

**Continous Table (4)**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | ***P.aeroginosa*** | ND | | ND | | 10 | R | 11 | R | 12 | R | ND | |
| 24 | ***P.aeroginosa*** | 21 | S | 11 | R | 12 | R | 31 | S | ND | | 20 | S |
| 25 | ***K. aerogense*** | 22 | S | 29 | S | 25 | S | 30 | S | 11 | R | 12 | R |
| 26 | ***E.coli*** | 11 | R | 18 | S | 12 | R | 29 | S | 10 | R | 19 | S |
| 27 | ***P.aeroginosa*** | ND | | ND | | ND | | 12 | R | 8 | R | ND | |
| 28 | ***E.coli*** | 12 | R | 10 | R | 9 | R | 11 | R | ND | | 17 | S |
| 29 | ***E.coli*** | 14 | S | 10 | R | 29 | S | 30 | S | 11 | R | 21 | S |
| 30 | ***P.aeroginosa*** | ND | | ND | | ND | | ND | | 12 | R | ND | |
| 31 | ***E.coli*** | 12 | R | 18 | S | 12 | R | 12 | R | 23 | S | 20 | S |
| 32 | ***K. aerogense*** | 10 | S | ND | | 31 | S | 11 | R | 30 | S | 21 | S |
| 33 | ***E.coli*** | ND | | ND | | ND | | 11 | R | 30 | S | 21 | S |
| 34 | ***E.coli*** | 11 | R | 12 | R | 10 | R | ND | | 12 | R | 21 | S |
| 35 | ***K. aerogense*** | 20 | S | 30 | S | 12 | R | 30 | S | 24 | S | 12 | R |
| 36 | ***E.coli*** | ND | | ND | | ND | | 30 | S | 10 | R | ND | |
| 37 | ***K. aerogense*** | 12 | R | ND | | 30 | S | 30 | S | 8 | R | 19 | S |
| 38 | ***E.coli*** | 11 | R | 11 | R | 29 | S | 30 | S | 31 | S | 20 | S |
| 39 | ***E.coli*** | 20 | S | 11 | R | 33 | S | ND | | 11 | R | 12 | R |
| 40 | ***E.coli*** | 11 | R | 12 | R | ND | | 29 | S | 23 | S | 20 | S |
| 41 | ***E.coli*** | 12 | R | ND | | ND | | 31 | S | 21 | S | 21 | S |
| 42 | ***K. aerogense*** | 21 | S | ND | | 33 | S | 35 | S | 25 | S | 11 | R |
| 43 | ***E.coli*** | 11 | R | 11 | R | ND | | 30 | S | 28 | S | 20 | S |
| 44 | ***E.coli*** | 12 | R | 12 | R | 11 | R | 32 | S | 12 | | 22 | S |
| 45 | ***K. aerogense*** | 10 | R | 8 | R | 33 | S | 35 | S | 30 | S | 20 | S |
| 46 | ***E.coli*** | 12 | R | ND | | 10 | R | 31 | S | ND | | 21 | S |
| 47 | ***E.coli*** | 20 | S | 37 | S | 12 | R | 32 | S | ND | | 11 | R |
| 48 | ***E.coli*** | 12 | R | ND | | 8 | R | 32 | S | 10 | R | 21 | S |
| 49 | ***E.coli*** | 12 | R | ND | | 30 | S | 30 | S | ND | | 20 | S |
| 50 | ***K. aerogense*** | 27 | S | 27 | S | 10 | R | 12 | R | 11 | R | 12 | R |

S= Sensitive , R= Resistance , IZ= Inhibition zone (mm) , ND= Not detected (0.00)

**Table (5): Sensitivity test of pathogenic isolates against different antibiotics**

| Tested antibiotic | Sensitive isolate | | Resistant isolate | |
|---|---|---|---|---|
| | No | % | No | % |
| **Nitrofurrantion (F)** | 34 | 68.0 | 16 | 32.0 |
| **Amikin (AK)** | 10 | 20.0 | 40 | 80.0 |
| **Noroxin (NOR)** | 30 | 60.0 | 20 | 40.0 |
| **Septrin sulfatrimero (SXT)** | 15 | 30.0 | 35 | 70.0 |
| **Ampicllin (Am)** | 12 | 24.0 | 38 | 76.0 |
| **Cephradine (Ce)** | 14 | 28.0 | 36 | 72.0 |

**Table (6): Statistical analysis of sensitive and resistant pathogenic bacterial isolates against different antibiotics.**

**a) Antibiotic nitrofurrantion**

| *Tested strains* | *Sensitive* | | *Resistant* | | $X^2$ | *P* |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | | |
| *E.coli* | 19 | 55.9 | 10 | 62.5 | 1.73 0.4 | NS |
| *K. aerogense* | 8 | 23.5 | 5 | 31.3 | | |
| *P. aeroginosa* | 7 | 20.6 | 1 | 6.3 | | |

**b) Antibiotic amakin**

| *Tested strains* | *Sensitive* | | *Resistant* | | $X^2$ | *P* |
|---|---|---|---|---|---|---|
| | *No.* | *%* | *No.* | *%* | | |
| *E.coli* | 5 | 50.0 | 24 | 60.0 | 4.91 0.08 | NS |
| *K. aerogense* | 5 | 50.0 | 8 | 20.0 | | |
| *P. aeroginosa* | 0.0 | 0.0 | 8 | 20.0 | | |

**c) Antibiotic noroxin**

| Tested strains | Sensitive | | Resistant | | $X^2$ | P |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | | |
| *E.coli* | 17 | 56.7 | 12 | 60.0 | 0.82 0.6 | NS |
| *K. aerogense* | 9 | 30.0 | 4 | 20.0 | | |
| *P. aeroginosa* | 4 | 13.3 | 4 | 20.0 | | |

**d) Antibiotic septrin sulfatrimero**

| Tested strains | Sensitive | | Resistant | | $X^2$ | P |
|---|---|---|---|---|---|---|
| | No. | % | No | % | | |
| *E.coli* | 9 | 60.0 | 4 | 11.4 | 12.9<0.01 | Significant |
| *K. aerogense* | 5 | 33.3 | 24 | 68.6 | | |
| *P. aeroginosa* | 1 | 6.7 | 7 | 20.0 | | |

**e) Antibiotic ampicillin**

| Tested strains | Sensitive | | Resistant | | $X^2$ | P |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | | |
| *E.coli* | 5 | 417 | 8 | 21.0 | 2.2 0.32 | NS |
| *K. aerogense* | 5 | 41.7 | 24 | 63.2 | | |
| *P. aeroginosa* | 2 | 16.7 | 6 | 15.8 | | |

**f) Antibiotic cephradine**

| Tested strains | Sensitive | | Resistant | | $X^2$ | P |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | | |
| *E.coli* | 7 | 50.0 | 6 | 16.7 | 6.01 0.04 | Significant |
| *K. aerogense* | 5 | 35.7 | 24 | 66.7 | | |
| *P. aeroginosa* | 2 | 14.3 | 6 | 16.7 | | |

**Table (7): Minimum inhibitory concentration (MIC) (µg/ml) and minimum bactericidal concentration (MBC) of different antibiotics.**

| **Organism used** | (MIC) ( µg/ml) | | (MBC) ( µg/ml) | |
|---|---|---|---|---|
| *K.aerogense* | Noroxin 125 | | Noroxin 250 | |
| *P.aeroginosa* | Amikin 250 | | Amikin 250 | |
| *E.coli* | Nitrofurration 31.25 | Cephradine 15.625 | Nitrofurrantion 250 | Cephradine 125 |

## Discussion

Diabetes mellitus is one of the diseases which is often said to be associated with a marked increase in the incidence of urinary tract infection. The most widely used method of obtaining urine samples for culture is by clean midstream urine. The incidence of urinary tract infection with diabetes mellitus is higher in old age group (above 50 years) and this higher incidence is due to chronicity of disease and the presence of increased amount of glucose in the urine resulting in more, rapid multiplication of bacteria (Asscher *et al.*, 1995), on the other hand, it is the better media for multiplication of microorganisms especially *E.coli*.

*E.coli* strains are a heterogeneous group of microorganisms with a wide spectrum of interactions with host (human and animal). These strains range from non-pathogens or normal host flora to true pathogens and include opportunistic organisms such as uropathogenic *E.coli* (Donnenberg and Kaaper, 1992 and Nataro and Levine, 1994).

In this investigation, 50 samples out of 78 diabetes mellitus cases were harboring *E.coli*, *K.aerogense* or *P.aeroginosa* (table 1). The specimens were collected from patients attending the outpatient clinics of Zagazig university and tropical diseases hospital.

The emergence of antibiotic resistant microorganisms is one of the most dangerous phenomena of the last twenty years and several strategies have been proposed to try to understand. The appearance of new opportunistic microorganisms often multi-resistnat and the developing resistance to antibiotics in well known pathogens (Stephani and Agodi, 2000). In both cases the answer is the acquisition and spread of a variety of antimicrobial determinants resulting from mutation of normal cellular genes, acquisition of foreign resistant genes or a combination of these two mechanisms (Courvalin, 1999).

In this investigation, the eight strains of *P.aeroginosa* were tested against 6 different antimicrobial chemotherapeutic agents. All isolates were found to be sensitive to all antimicrobial agents under test. A high sensitivity has been expressed by *P.aeroginosa* strains against noroxin while the lowest activity showed towards nitofurrantion, septrin sulfatrimero, ampicillin and cephradine. In other studies performed, *P.aeroginosa* strains were susceptible to amikin (Mikhail *et al.*, 1990).

It is evident from table (4) that about 3 among 29 isolates (10.3%) were sensitive to cephradine, 4 out of 29 isolates (13.8 %) were sensitive to ampicillin, 5 out of 29 isolates (17.2%) were sensitive to septrin sulfatrimero and also to amikin, 17 of isolates (58.6%) were sensitive to noroxine and 24 (82.8%) isolates were sensitive to nitofurrantion. The rest of isolate species of *E.coli* were resistant to tested antibiotics. The resistance of *E.coli* toward nitrofurrantion were usually chromosomally mediated (rather than the transferble ones mediated by plasmids (Ahmed, 2004) it may explain our findings that 82.8% of isolates under test were nitrofurrantion sensitive.

Results of susceptibility of *Klebseilla aerogense* against antimicrobial chemotherapeutic agents in present study showed that, all tested isolates were sensitive to cephradine, noroxin, amakin, septrin sulfatrimero, ampicillin and nitrofurrantion. A high sensitivity has been expressed by *K.aerogense* strains against septrin sulfatrimero, noroxin, cephradine and nitrofurrantion. While the lowest sensitivity showed by ampicillin and amakin, the classical drugs of choice against *K.aerogense* infection, is very rare in naturally occurring by *K. aerogense* (Terakado *et al.*, 1975 and Spika *et al.*, 1987). Waffa *et al.* (1998) reported that the resistance of *K.aerogense* toward ampicillin was 39% and with respect to the high level of resistance to ampecllin. Kambal (1996) from Saudi Arabia and Lee *et al.* (1994) from USA and Ling *et al.* (1991) from Hong kong indicated that their isolates of *K.aerogense* were significantly less resistant than present strain.

In most developing countries antibiotics are available without a prescription as in Egypt and the need for

public awareness against the misuse of antibiotics is important, simultaneously, some useful but expensive drugs such as cephradine should be used with caution to prevent or slow down the emergence of drug resistance which seems inevitable with wide spread on indiscriminate use.

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# عزل بعض الكائنات الدقيقة التي تصيب الجهاز البولي لمرضي السكر وتأثير بعض المضادات الحيوية عليها

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الجماهيرية الليبية

إصابة الجهاز البولي مشكلة صحية هامة وخصوصا لمرضي السكر. أجريت هذه الدراسة علي 78 من المرضي الذين يعانون من مرض السكر والذين يعالجون بالانسولين والذين لم يعالجوا. هؤلاء المرضي من أعمار مختلفة تتراوح ما بين 30–70 عاما بالنسبة للرجال و 35–60 عاما بالنسبة للسيدات . تم جمع عينات البول من هؤلاء المرضي . تم فحص العينات مجهريا وإجراء التجارب الكيميائية الحيوية والفسيولوجية للتعرف علي الكائنات المختلفة التى تصيب الجهاز البولي. وقد تم إجراء اختبار الحساسية للمضادات الحيوية المختلفة للتعرف علي أكثرها تأثيرا علي هذه الكائنات.

وقد وجد أن 50 مريض من 78 مريض يعانون من أصابة الجهاز البولي. والكائنات التى تم التعرف عليها هي إيشيريشياكولاي, كليبسيلا إيروجينس والسودوموناس إيروجينوزا. ووجد أيضا أن النيتروفيران (68٪) هو أكثر المضادات الحيوية تاثيرا علي هذه الكائنات ثم يليه النوروكسين (60٪) ثم سبترين سلفا ترايميرو (30٪) ثم سيفرادين (28٪) ثم أمبيسيلين (24٪) ثم أميكين (20٪).