

# Urinary tract infection among patients with bladder cancer : Bacteriological studies

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## Abstract:

Certain infections, such as urinary tract infection may have an increased incidence in bladder cancer owing to physiological changes. One mechanism of initiating innate host defenses against bacteria in UTI's is the production of cytokines.

In this study, we investigated prevalence urinary tract infection among bladder cancer patients and the factors associated with the acquisition, and the description of the isolated pathogens in bladder cancer patients.

This descriptive study was carried out through the period from January to may 2012 , 40 bladder cancer patients were collected from Baghdad Medical City , Medical City Teaching Laboratories and private laboratories and 20 case controls .The study groups were 40 urine samples from bladder cancer patients ; urine samples taken for tests, and cultures and 40 subjects as health control group from both sexes .

The study showed that Staph. aureus was the most common microorganism isolated from UTI which represented (34 %). E.coli was found to be the second most common microorganism encountered in UTI (30.7%) Klebsiela spp. was found to be the third microorganism which represented (11.5%).Proteus spp. was fourth microorganism isolated which represented (15.3%) , while ( 7.6%) of microorganism was Pseudomonas, with p. value > 0.005 that mean no significant differences between the microorganisms that can cause infection in patient with other disease .

The study also showed two groups , group (1) was patients with cancer bladder , In this group number of UTI was 65%(male &female) , while 35% of cancer bladder patients were without UTI with non-significant differences .

Finally there is non-significant differences among groups of patients with Bladder cancer were divided into five groups , group one included (14) patients (35%) suffering from Bladder cancer only, group 2 included 10 patients (25%) suffering from bl. Cancer and D.M, group 3 included 7 patients (17.5%) suffering from bl. Cancer and hypertension , group 4 included 3 patients (7.5%) suffering from blood cancer and renal failure , group 5 included 6 patients (15.0) suffering from b. cancer and other diseases ( anemia , leukemia, CV and polycythemia).

**Key words:** Bladder cancer, Staph., Catalase.

## Introduction:

Chronic inflammation has been implicated in the pathogenesis of several forms of cancer , including gastric carcinoma after atrophic gastritis(1), colon carcinoma after ulcerative colitis (2), and squamous carcinoma in a drain-

ing sinus of chronic osteomyelitis (3). Epidemiological studies (4,5) have suggested that urinary tract infection is a significant risk factor for the development of bladder cancer. Deeply invasive squamous cell carcinoma in patients with urinary tract schistosomiasis (6)are examples of bladder cancers related to chronic inflammation .

Bacterial infection that develop in your urinary tract which is lead to urinary tract infection are characteris by bactpose of the bladder (7) ,the majority of UTI are due to gram negative aerobic or facultative bacilli that include E.coli , Staph. , Pseudomonas and Klebsiella they are often isolated mixed with Enterobacteriaceae(8,9).

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## Materials & Methods:

Through the period from January to May 2012, 40 bladder cancer patients and 40 case controls were studied in Iraqi center for cancer and medical genetics researches. The system of this study was planned to be bacteriological bladder cancer disease study. The bladder cancer patients were interviewed and a detailed questionnaire was completed. The data requested included the age, occupation, frequency of micturition, nocturia, dysuria, burning micturition, fever, incontinence, hematuria, toxemia if any, diabetes, bilharziasis and renal stones, other associated disease and drug intake or not by patients. Midstream specimens of urine were collected by using the (clean catch) technique and the subsequent midstream urine, voided directly into a sterile disposable container. After that the sterile disposable container was labeled. The urine sample of patients which were collected from either laboratories of Baghdad Medical City or from private microbiology laboratories for microscopical examination and culture within 30 min. of collected for male and female according to age and other disease associated with bladder cancer such as D.M, Rf. And this urine are incubated at 37 °C for 24h after incubation, the measured number of colonies, those isolates were identified using the standard method. (5)

### - General Urine Examination

Macroscopical examinations including color, turbidity, specific gravity, pH, glucose, protein, and bilirubin were evaluated. The urine samples were mixed and aliquots were centrifuged at 5000 rpm for 5 min. The deposits were examined microscopically using both X10 and X40 objectives. Samples with 10 white blood cells/mm<sup>3</sup> were regarded as pyuric. (6) Urine samples were applied to a glass microscope slide, allowed to air dry, stained with Gram stain, and examined microscopically. Bacterial isolates were identified generally using a battery of tests. (7)

### - Microscopic examination is performed to determine the:

1. Pus cells (Leukocyte) / high power field (HPF).
2. Red blood cells (R.B.Cs) / HPF.
3. Epithelial cells./HPF
4. Casts/HPF.
5. Presence of monilia.
6. Crystals.
7. Others

### - Culture

A calibrated sterile platinum wire loop for the semi-quantitative method was used for the plating, and it had a 4.0 mm diameter designed to deliver 0.01mL. A loopful of the well mixed urine sample was inoculated into duplicate plates of Blood and MacConkey agar. All plates were then incubated at 37°C aerobically for 24 hrs. The plates were then examined macroscopically and microscopically for bacterial growth. The bacterial colonies were counted and multiplied by 100 to give an estimate of the number of bacteria present per milliliter of urine. A significant bacterial count was taken as any

count equal to or in excess of 10.000 cfu/mL. (8)

### - Gram Stain

A colony is dried on a slide and treated with Gram stain.

### - Identification of Bacteria

Colonies were morphologically studied on MacConkey agar and blood agar. So further identifying of the isolates after culture was done by performing the staining with Gram stain for determining the type of bacteria either G +ve or G -ve followed by the biochemical tests. (9)

- Catalase Test
- Citrate Utilization Test
- Coagulase Test (Slide Coagulase Test)
- Hydrogen Sulfate (H<sub>2</sub>S) Production
- Indole Test
- Motility Test
- Oxidase Test
- Urease Activity

## Result:

The total of 80 samples were received and examined, the positivity of UTI was found to be 58.3% in male and 75% in female in bladder cancer as depicted in table no. (1), but there was absence of growth in 40 (case control) 0% sample. The rate of culture Gve+ was (25%) (2 out of 8) in patients with UTI where as in Gve- was (75%) (6 out of 8) and in patient with other diseases we found Gve+ (38.8%) (7 out of 18) and Gve- (61.2%) (11 out of 18) depicted in table No.3.

Age and sex distribution of total pt. attending the laboratory for diagnosis of UTI shows in table No.2 amongst male ages group (50-59) years, followed by (60 - 69) and (70 - 79) years and amongst female age group (60 -69) were predominant age group in terms incidence. The proportion of bladder cancer with other diseases show in table No. 4 the higher percentage in male which represented (66.6%) in patients with RF, but the opposite in female which were higher percentage (40%) with D.M and the from other disease. But the difference microorganism in patients with bladder cancer in table No. 5, we found that patients with proteus (50%) in UTI and pseudo (50%) in patient with UTI and D.M and other microorganism can cause infection in patient with bladder cancer such as E-coli and Klebsiella. p.value > 0.005 that mean no significant differences between the microorganisms that can cause infection in patient with other disease.

Table (1): distribution of urinary tract infection (UTI) in bladder cancer patients and control .

Study group	No.	%	Male						Female					
			NO.	%	UTI	%	NOR.	%	NO.	%	UTI	%	NOR.	%
Bladder cancer	40	66.6	24	60	14	58.3	10	41.6	16	40	12	75	4	25
Control	40	33.4	25	75	0	0	25	100	15	25	0	0	15	100
Total	80	100	49	65	14	35.8	35	41.6	31	35	12	20	19	15

**X<sup>2</sup> =22.94 , P. value= 0.0 (H.S differences of UTI between cancer bladder patients and control**

\* Table (1) shows two groups, group (1) was patients with cancer bladder , In this group number of UTI was 65%(male&female) , while 35% of cancer bladder patients were without UTI .

Group (2) was control group (healthy group) . All this group were without UTI (100%)

Table(2) : distribution of age and sex in the study group.

Age group	No.	%	male	%	female	%
< 50	1	2.5	0	0	1	100
50-59	6	15	4	66.6	2	33.3
60-69	16	40	10	62.5	6	37.5
70-79	17	42.5	11	64.7	6	35.2
Total	40	100	25	62.5	15	37.5

**X<sup>2</sup>=0.061 , P.value= 0.8 (N.S) differences between male and female in age**

Table(2) :

The ages of study groups were divided into four groups group one less than 50 years included one patient was female who represented ( 2.5%) , group two from 50 to 59 years included six patients (15%) 4 patients were males and 2 patients were females , group three from 60- 69 years included sixteen pa-

tients (40%) , 10 patients were males and 6 patients were females and 6 patients were female and group four from 70 to 79 years included seventeen patients ( 42.5%) , 11 patients were males and six patients were females .

Table (3) : Distribution of G+ve and G-ve bacteria in (UTI) and UTI with other disease .

Study group	No	%	Gve+	%	Gve-	%
UTI	8	30.7	2	25	6	75
UTI & other disease	18	69.2	7	38.8	11	61.2
Total	26	99.9	9	34.6	17	

**X<sup>2</sup>= 0.47, P.value= 0.492 (N.S)**

The data presented in table (3) showed that most prevalent micro organism were gram – negative bacilli as causative agents of UTI (65.3%) which is greater than that caused by gram – positive bacteria (34.6%)

Table (4) : Incidence of bladder cancer with other diseases according to sex

Associated disease	No.	%	male	%	female	%
Bl.Ca.	14	35	9	64.2	5	35.7
Bl.Ca.&D.M	10	25	6	60	4	40
Bl.Ca.& HP	7	17.5	4	57	2	28.5
Bl.Ca.w-R.f	3	7.5	2	66.6	1	33.3
Bl.Ca.&other Disease	6	15.0	4	66.6	2	33.3
Total	40	100	25	62.5	12	37.5
X <sup>2</sup> = 0.116, P. value = 0.99 (N.S)						

Table (4) : study groups of patients with Bladder cancer were divided in to five groups , group one included (14) patients (35%) suffering from Bladder cancer only 2 included 10 patients (25%) suffering from bl. Cancer and D.M, group 3 included 7 patients (17.5%) suffering from bl. Cancer and

hypertension , group 4 included 3 patients (7.5%) suffering from b. cancer and renal failure , group 5 included 6 patients (15.0) suffering from blood cancer and other diseases ( anemia , leukemia, CV and polycythemia).

Table (5): Relative frequency of different microorganism among cancer bladder patients.

Type of bacteria	No.	%	UTI	%	DM	%	R.F	%	Hp	%	Other disease	%
Staph	9	34	2	22.2	3	33.3	1	11.1	2	22.2	1	11.1
E.coli	8	30.7	3	37.5	2	25	0	0	2	25	1	12.5
Klebsiela	3	11.5	0	0	1	33.3	1	33.3	0	0	1	33.3
Proteus	4	15.3	2	50	0	0	0	0	1	25	1	25
Pseudo	2	7.6	1	50	1	50	0	0	0	0	0	0
Total	26	100	8	30.7	7	26.9	2	7.6	5	19.2	4	15.3
X <sup>2</sup> = 9.95, P.value = 0.49 (N.S)												

The data present in table 5 shows the different microorganisms isolated with their frequencies in all groups under study. Staph. aureus was the most common microorganism isolated from UTI.

E. coli was found to be the second most common microorganism encountered in UTI (30.7%).

Klebsiela was found to be the third microorganism which represented (11.5%)

Proteus was fourth microorganism isolated which represented (15.3%). while (7.6%) of microorganism was Pseudomonas.

## Discussion :

UTI are one of the most commonly diagnosed infection in hospitals , microorganism causing UTI vary in their

susceptibility to antimicrobials from place to place and time to time(9) el-Bashier chan(2) &Dyer(3) report that E. coli is the most common cause of UTI .

A-Tahawi (8) reported that E-coli is the most common organism isolated from community and hospital acquired UTI (8) The prevalence of UTI accrued more in male than in female specially in age between (50-59) years in male and (60-69) years in female .UTI are caused by variety of microorganism including both G +ve and G -ve . ones in our study E-coli is higher with UTI ( 37.5%) and Klebsiela (33.3%) in patients with D.M , R.F, anemia and leukemia , Pseudo . (50%) in D.M,UTI patients and proteus (50%) in patients with urinary tract infection respectively . This finding agree with report which indicated that G -ve bacteria mostly are the commonest pathogens isolated in Patients with UTI (10-11) .

The present investigation demonstrates that bacterial infection is not significant to develop the tumor of bladder cancer in the group of patients.

This suggests that oxidative stress by the bacteria is insufficient to induce tumors but may be sufficient to augment neoplastic changes induced by bacterial infection. (12,13) These observations suggest that the cytokine network induced by bacterial infection may play a significant role in cell proliferation in inflammation – induced urothelial hyperplasia. Furthermore, there is a possibility that cytokines such as TNF(19) IL-8(20), which have chemotactic and angiogenic activity, may be involved in the development of the marked vascular proliferation in the stroma and of PMN aggregation

within the epithelium, which are characteristic of the tumors observed in the present and previous studies(15).

#### Conclusion:

- The commonest organism isolated from urinary tract infection of patients with bladder cancer was *S. aureus*.
- The present study revealed no correlations found between type of bacteria in urine of UTI and bladder cancer in patients with bladder cancer.
- The studies showed that there was no significant correlation between UTI and bladder cancer.
- The correlations between ages of bladder cancer patients and sex was non significant.

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# التهاب المجاري البولية لدى مرضى سرطان المثانة: دراسات بكتريولوجية

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## الخلاصة :

أن بعض الأمراض المعدية مثل الخمج في الجهاز البولي ربما تزيد من نسبة الإصابة بالسرطان بسبب التغييرات الفسيولوجية . أن آلية واحدة من بدء دفاعات المضيف الفطرية ضد البكتيريا في المسالك البولية هو إنتاج السايبتوكينات . وفي هذه الدراسة نحاول التحقق من انتشار عدوى المسالك البولية لدى المرضى المصابين بسرطان المثانة , وأجريت الدراسة الوصفية بعد جمع العينات من مدينة بغداد الطبية والمختبرات التعليمية والمختبرات الخاصة للفترة من كانون الثاني الى حزيران لسنة 2012 . تضمنت العينة 40 نموذج من الأدرار للمرضى المصابين بسرطان المثانة و20 عينة للأصحاء كنماذج سيطرة من كلا الجنسين وتم إجراء فحص الأدرار العام على النماذج وزرع النماذج المصابة بالخمج البكتيري . ولقد أظهرت النتائج بشيوع البكتيرية العنقودية في التهاب المجاري البولية حيث كانت نسبتها 34 % بينما احتلت البكتيرية المعوية المرتبة الثانية بنسبة 30.7 ثم بكتريا Proteus بنسبة 15.3 , 11.5 % لل Klebsiela و 7% لل Pseudomonas ولم يكن هناك فرق معنوي بين أنواع البكتيريا حيث أن ال P-valu  $> 0.005$  وكذلك أظهرت الدراسة بعدم وجود فرق معنوي بين مجموعة المرضى المصابين بسرطان المثانة الذين لديهم خمج بكتيري والمجموعة الأخرى الذين ليس لديهم هذا الخمج . وأخيراً أظهرت الدراسة بعدم وجود فرق معنوي بين مجاميع المرضى الذين يعانون من سرطان المثانة فقط والمجاميع الأخرى الذين يعانون من أمراض أخرى مع سرطان المثانة .