

Correlation Of Sociodemographic Factors and Clinical presentation Of Urinary Tract Infections Caused By *Proteus mirabilis*

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Abstract

The current study included 250 individuals with symptoms of urinary tract infections. Only 60 samples were positively growing (24%) and identified as *Proteus mirabilis*. The mean age of patients was (27.88 ± 11.680) years old. For the first age group (17-23) years old, (33.33 %) showed positive *P. mirabilis* growth. The least age group with positive culture was 3-9 and 10-16 years old, each with 4% with significant difference (p value =0.000). The educational level of (66.67%) patients with positive *P. mirabilis* was the secondary education. Patients with primary education were positive *P. mirabilis* growth represented 1.67% with significant difference (p value =0.000). A total of (93.33%) of positive patients were using filtrated water. The residency of (63.33%) of positive cases was Baqubah, while the least was from Khalis and Khan keen (3.34%) with a significant difference (p value =0.000). The prominent symptom for UTI was flank pain in (63.33%) patients, followed by fever (45%) and hematuria (43.33%), with significant difference (p value =0.04). Dysuria represented the minimum complain (13.33%) of patients with positive *P. mirabilis* growth, with significant difference (p value =0.04).

In conclusion, infection with *P. mirabilis* represented a serious problem in children and adults, flank pain, hematuria and fever represent the prominent symptoms for UTI that might correlated with UTI.

Keywords : *Proteus mirabilis*, urinary tract infection, Sociodemographic factors, Clinical symptoms

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Introduction :

Urinary tract infections (UTIs) are one of the most common infectious diseases, and nearly 10% of people will experience a UTI during their lifetime^[1, 2]. Although several different micro-organisms can cause UTIs, including fungi and viruses, bacteria are the major causative organisms, they are responsible for more than 95% of UTI cases^[3]. Urinary Tract Infection defines a condition in which the urinary tract is infected with the pathogen causing inflammation. The major cause of UTI is gram negative bacteria which belongs to the *Enterobacteriaceae* family^[4]. *Proteus* is considered as the main causative agent of urinary tract infection after *E.coli*, especially *proteus mirabilis*. *Proteus* species known as they are opportunistic bacteria that are gram-negative, they belong to the family *Enterobacteriaceae*, They are widely distributed in natural environment and as microflora in human and animal intestines. In suitable conditions, they can cause wound, skin and urinary tract infec-

tions (UTIs) in animals and humans and can cause rheumatoid arthritis^[5]. *P. mirabilis* is capable of causing symptomatic infections of the urinary tract including cystitis and pyelonephritis and is present in cases of asymptomatic bacteriuria, particularly in the elderly and patients with type 2 diabetes^[6, 7]. These infections can also cause bacteremia and progress to potentially life-threatening urosepsis. Additionally, *P. mirabilis* infections can cause the formation of urinary stones (urolithiasis).^[8, 9] *P. mirabilis* causes between 1-10% of all urinary tract infections, varying with the geographic location of the study, the types of samples collected, and the characteristics of the patients examined^[10, 11].

Current study aims to isolation and identification of *P.mirabilis* from urine samples of infected human; studying the frequency of *P.mirabilis* associated UTI in human and the correlation of sociodemographic factors and clinical presentation Of Urinary Tract Infections With *P. mirabilis*.

Patients and Methods :

Study area and study population

This study was conducted on human living in Baqubah city -Diyala Province 33°45'34.71"N; 44°36'23.97"E, Northeast. The study extended from October 2017 to April 2018^[12-14].

Ethical consideration:

This study conducted according to the principles of Helsinki declaration. A full explanation of the purpose of this study in all patients before starting. Dully filled consent form obtained from all patients who agree to participate in the study. Approval of an ethical review committee of pathology department, college of veterinary medicine, Diyala University, Iraq, taken before initiation into the work^[12, 15-21].

Urine samples from human:

A total of 60 individuals with the mean age was 27.88± 11.68 years, 22 were male while 38 were females attended to Albatoul hospital for mater-

nity and children health and Baqubah general hospital due to hard and permanent motive for urination, burnings feeling during urination and crossing recurrent, little amount of urines, patient with red colour, cloud looks, or even pink's brighten or colored of colas is the signs of finding bloods in urine urination, with robust -smell urines were enrolled in current study.

Midstream urine samples of were collected in a special tightly capped leak proof containers and labeled with special patient barcode for further investigations, all patients subjected to questionnaire before samples collected. Each sample was divided into two portions: one used for immediate examination, and another one used to culture on previous prepared blood agar and MacConkey agar for further identification and preservation

Microscopic and General urine examination:

About 10 ml of urine centrifugate and pellet placed on a clean glass slide and covered with cover slip and examined

under magnifications of 10X and 40X with reduced light. Crystals and bacteria are estimated as “few,” “moderate,” or “many” according to sample, which indicate the infection.^[22]

Identification Of Isolates:

Growth On Selective And Differential Media

The urine specimens were directly streaked onto MacConkey and blood agars and incubated at 37°C aerobically for 24 hours. The isolates were identified by bacteriological and biochemical assay. primary identification by morphological features such as swarming on blood agar, inability to ferment lactose on MacConkey agar and Gram staining propriety^[23]

Microscopic Examination:

After culturing ,Single colony were picked up after the isolation of bacteria on MacConkey agar and blood agar, stained with gram stain , then examined under microscope to recognize their shape and length according to^[23]

Vitek2 For Identification:

Identification of microorganisms is also accomplished by biochemical methods in Vitek system^[24].It was used according to the manufacturer's instructions and^[25]. The ID-GNB card Vitek 2 was used for identify the rod as (gram negative) by three hours.

Results

As shown in table (1) ,the mean age of human presented with UTI was (27.88 ± 11.680) years, .A total of 250 samples have been collected from urinary tract infected patients, 60 samples were positively growing (24%) and were identified as *P. mirabilis* . The first age group with UTI and positive *P. mirabilis* was 17-23 years , (33.33 %). The least age group with positive culture was 3-9 years ,10-16 years ,each with 4% with significant difference (p value =0.000) .The educational level of (66. 67%) patients with positive *P. mirabilis* was secondary education ,while patients with primary education and positive *P. mirabilis* represent 1.67% with signif-

It uses a fluorogenic methodology for organism identification and a turbidimetric method for susceptibility testing using a 64 well card that is bar-coded with information on card type, expiration date, lot number and unique card identification number. Test kits available include ID-GN (gram negative bacillus identification), ID-GP (gram positive cocci identification), AST-GN (gram negative susceptibility) and AST-GP (gram positive susceptibility). In the level of species it explicate forty-one fluorescents in tests of biochemical. If bio pattern don't matches with one of the taxon that particularly found in the database, results will be reports “low discrimination” (taxa two to three), “inconclusive” (> three taxa), or “unidentified” (zero-matches). the result will be vague when slow nonfermenters metabolize ,it will be reported “various non fermenting gram-negative bacilli.”^[26]

Statistical Analysis :

Data were statistically described in terms of frequencies and relative frequencies (percentages)^[27, 28] . T test used for evaluation the differences^[29, 30] . All statistical calculations were done using Microsoft Excel 2010 (Microsoft Corporation, New York,USA) and SPSS version 17^[15, 31].The level of significance was 0.05 (two-tail)^[19, 32] .

icant difference (p value =0.000)..A total of (93.33%) of positive patients drink filtrated water .The residency of (63.33%) of positive cases was Baqubah while the least was from Khalis and Khan keen (3.34%) with significant difference (p value =0.000).

As shown in table (2), the prominent symptom for UTI was flank pain (63.33%) followed by fever (45%) and hematuria (43.33%), with significant difference (p value

=0.04). Dysuria represent the minimum complain for human with positive *P. mirabilis* in urine sample, (13.33%) with significant difference (p value =0.04).

Table(1.): Demographic Features Of Human With Positive *P. mirabilis* In Urine Samples

Parameters	positive <i>P. mirabilis</i> In Urine sample	T test
Minimum	3	
Maximum	51	
Mean \pm SD	27.88 \pm 11.68	
Age (years)	3-9 10-16 17-23 24-30 31-37 38-44 45-51 Total	4(6.67%) 4(6.67%) 20(33.33%) 10(16.67%) 8(13.33%) 6(10%) 8(13.33%) 60(100%)
Gender	Male Female	22(36.67%) 38(63.33%)
Education level	Illiterate Primary Secondary Higher education	8(13.34%) 1(1.67%) 40(66.67%) 11(18.33%)
Water source	Tap water Filtrated Baqubah	4(6.67%) 56(93.33%) 52(86.66%)
Residence	Khalis Mukdadyia Khan keen	2(3.33%) 4(6.67%) 2(3.34%)

Table (2): Clinical presentations accompanied with UTI among human

Clinical presentations accompanied with UTI	Human with positive <i>P. mirabilis</i> in urine sample		Total
	Positive	Negative	
Dysuria	8 (13.33%)	52 (86.67%)	0.04
Hematuria	26(43.33%)	34(56.67%)	
Flank pain	38(63.33%)	22(36.67%)	
Fever	27(45%)	33(55%)	

Discussion

In current study, *P. mirabilis* more frequently isolated from females which come in line with [33]. *P. mirabilis* isolated commonly at the age from 17 to 37 among males and females which agree with [34] and disagree with that reported by [35], who reported that *P. mirabilis* prevalence was found to be highest (21.2%) in young males aged ≤ 14 years. Also disagree with [36], who reported that *P. mirabilis* was the second leading cause of UTI in pediatric population (0–13 years), accounting for 22.1% of isolates.

In current study *P. mirabilis* isolated commonly from patients owing secondary (66.67%) and higher education level (18.33%), which come in line with [34] and disagree with [35], found no correlation between education level and susceptibility of infection. In present study, the majority of patient drinks filtered water, although have positive culture for *P. mirabilis*, which reflect the possibility of its acquisition from other sources like food, vegetables, perennial region due to weak cleaning after toilet using or due to nosocomial infection which occurring more than 48 hours after hospital admission or after emergency department admission [37]. The fact that dirty hands may

be an important step in transmission of *Proteus spp* via feces-to-hand-to-mouth. This assumption was proved by [38] who detected *Proteus spp.* on hands of primary school pupils in Mauritius while [39] detects *Proteus spp* on hands of food handlers in Iran. *P. mirabilis* isolated from hand skin between nail plate and nail fold in motor mechanics [40]. *P. mirabilis* strains that isolated from urine and fecal samples seemed to display similar virulence potential, which confirmed that the strains attacking the urinary tract may come from the intestinal reservoir [40]. Baqubah district represent the main region for isolation of *P. mirabilis* from human, and this attributed to the majority of patients attending to Baqubah teaching hospital and Albatul teaching hospital were from the Baqubah district resident. The frequency of infection has no correlation with geographic area and attributed to the environmental contamination and availability of vectors. Vectors such as house fly, eye gnats, ants and cockroaches spread diseases by literally carrying pathogens on the surface of their bodies from place to place. Medically most important vectors are the common house fly (*Musca*

domestica) and the greater house fly (*Mus-*

cina stabulans),^[41].

The results of present study showed that the urine cultures reveal no growth of bacteria even in the presence of signs and symptoms of UTI this may be due to other pathogens rather than gram positive bacteria, like fungi, viruses. The present result come in line with other local study of^[34] in Kirkuk and higher than another study reported in Sarajevo, B&H the UTI in community ,which showed that the *P.mirabilis* recovered from 9.83%^[33] and in Italy 5.2%^[35]

As shown in present study, not all cases of human suffering from flank pain, hematuria, dysuria . According to Loeb and colleagues, the minimum criteria for initiating antibiotics for UTI include^[42] :Acute dysuria alone or Fever ($>37.9^{\circ}\text{C}$ or 1.5°C increase above baseline temperature) and at least 1 of the following: New or worsening(urgency ,frequency, Suprapubic pain, gross hematuria, costovertebral tenderness, urinary incontinence). one or more complain may present and not necessary the clinical presentation include all parameters .The present of more than three parameters indicate the present of infection and treatment is mandatory.

In conclusion ,*P. mirabilis* represent a n important causative agent for UTI . In human flank pain , fever, and hematuria were more common complains . The intensity of infection may affected by sociodemographic factors .

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