



Study of Urinary Tract Infection Among Pregnant Women Attending Al Elywiah Maternity Hospital in Baghdad / Iraq, Original study

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دراسة التهاب المسالك البولية بين النساء الحوامل المراجعات لمستشفى العلوية للولادة \ بغداد \ العراق

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Abstract

Urinary tract infection is a vary series symptom that pregnant women must be looking for treat as it effects in pregnant woman health baby for a long of 9 months of pregnant, this symptoms effect in different way on baby and mother health. The study on pregnant women carried out by examination of fresh samples taken from registered mothers in Maternity hospital and then carried varies analysis, physical, chemical and microscopic tests with bacterial and antibiotic sensitivity tests About 70 Urine sample taken from pregnant women that follow up their health in *Al Elywiah maternity Hospital*, the rested women with average age (18-39) years old. Results of physical examination showed that samples color of urine range from pale yellow , yellow to dark with turbid except two sample shows reddish color, although results of chemical examination, showed that must of pregnant have negative in sugar test except three, as they are young in age, or they have pregnant diabetic , also specific gravity showed highly positive results for most pregnant which mean that must of pregnant have infection with different type of amorphous and crystals in which pregnant have some symptom of difficult urination and pain that effect in their health and may effect baby , while result for bilirubin showing normal for all samples except two . Test for nitrite shows positive for eleven samples, while leukocyte esters showed positive in 35 samples.

Results of microscopic examination showed the results of RBC, WBC from (5-30 Cells) in the most sample, while for mucus most of samples show few, , fungi examination is normal all sample except two, the results of bacterial culture showed that more isolation of bacteria are *Enterococcus faesialis*, *Taphylococcus aureus*, *Klebsiella pneumoniae*, *Escherichia coli*, also



results shows present of *Candida Albicans* fungi in two samples, the sensitivity test of bacteria showed that antibiotic Cefepime , Nitrofurantion and Ceftarixone are most effective in bacteria, while Amoxyclav antibiotic showed intermediate in more sample, while Cefalexin is resistant in most samples.

Keywords: Urinary Tract Infection (UTI), Pregnant women, UTI antimicrobial resistance.

المستخلص

التهاب المسالك البولية هو من الالتهابات الخطيرة التي يجب على النساء الحوامل الانتباه لها حيث تؤثر على صحة المرأة الحامل والجنين خلال فترة الحمل والبالغة التسعة أشهر. هذه الأعراض تؤثر بطرق مختلفة على صحة الأم والطفل. أجريت الدراسة على النساء الحوامل من خلال فحص عينات من الادرار تم أخذها من الأمهات المسجلات في مستشفى العلوية للولادة، ثم أجريت تحليلات مخبرية متنوعة. بما في ذلك الفحوصات الفيزيائية والكيميائية والميكروسكوبية، ومعلومات واسئلة صحية للمرضى بالإضافة إلى اختبارات حساسية البكتيريا والمضادات الحيوية. تم أخذ حوالي 70 عينة من الادرار من النساء الحوامل اللاتي يتابعن حالتهم الصحية في مستشفى العلوية للولادة، وكانت أعمار النساء المشاركات في الدراسة تتراوح بين (18-39) عاماً. أظهرت نتائج الفحص الفيزيائي أن لون العينات يتراوح بين الأصفر الشاحب، والأصفر، إلى الداكن مع وجود عكارة، باستثناء عينتين أظهرتا لوناً مائلاً للأحمر، أظهرت نتائج الفحص الكيميائي أن معظم النساء الحوامل لديهن نتائج سلبية في اختبار السكر باستثناء ثلاث،، ويعزى ذلك الى إنهن صغيرات في السن، والبعض لديهن مرض سكر الحمل ، كما أظهر فحص (الأملاح والرمل) نتائج إيجابية عالية لمعظم الحوامل مما يعني أن معظم الحوامل لديهن عدوى من أنواع مختلفة من المواد غير المتبلورة والبلورات (رمل وأملاح)، حيث تعاني الحوامل من بعض الأعراض مثل صعوبة التبول والألم الذي يؤثر على صحتهم وقد يؤثر



على الطفل، بينما كانت نتائج فحص البيليروبين طبيعية لجميع العينات باستثناء عينتين. أظهر اختبار النترات نتيجة إيجابية لحدي عشر عينات، في حين أظهرت كريات الدم البيضاء نتائج إيجابية في خمس وثلاثون عينة.

أظهرت نتائج الفحص المجهرى نتائج كريات الدم الحمراء وكريات الدم البيضاء من (5-30 خلية) في معظم العينات، بينما أظهرت معظم العينات احتواءها على خلايا صديدية او قححية. وكانت فحوصات العينات للفطريات طبيعية في جميع العينات باستثناء اثنتين. أظهرت نتائج فحص البكتيريا أن العزل الأكثر للبكتيريا هو الإنيتيروكوكوس فيسياليس، والمكورات العنقودية الذهبية، والكلبسيلا الرئوية، والإشريشا كولاي القولونية. كما تشير النتائج إلى وجود فطريات كانديدا ألبيكانس في عينتين. كما أظهر اختبار حساسية البكتيريا أن المضاد الحيوي سيفيبيم، والنيتروفورانتوين، والسيفتاريكسون هي الأكثر فعالية ضد البكتيريا، بينما أظهر المضاد الحيوي أموكسيسكلاف نتائج متوسطة في المزيد من العينات، بينما كان السيفاليكسين مقاومًا في معظم العينات.

الكلمات المفتاحية: التهاب المجاري البولية، النساء الحوامل، المضادات

الحيوية و البكتريا المرضية



Introduction

Urinary tract infection(UTI), are the most common infection among pregnant women and have been associated with maternal and fetal complication, where one or more part of urinary system become infected, usually after bacteria overcome the natural defense mechanism of urinary tract (Yveline, *et al.*, 2023)(Al-Dujaily, 2000) (Akerelle, *et al.*, 2001).

UTI in female had higher frequency than men due to recurrent infection, and restrictions antimicrobial agents use during pregnancy, also in women the ease of urinary tract contamination by faecal flora and various other reasons (Blastein`s, 2019) (Fowler, 1986) Pregnant women are at high risk of UTI. It have been estimated that, all types of UTIs combined effect approximately 2%- 15% of women and this percentage increase in pregnant (Yveline, *et al.*, 2023) . In women, in general, the incidence of Urinary tract infection is more frequent, especially in pregnant time as compared to non-pregnant woman, due to so reasons, that pregnancy associated with physiological and anatomical changes, extended abdomen and difficulty of personal hygiene (Awaness, *et al.*, 2000). Also, increased bladder volume and decrease tone with decrease urethral tone, that contribute to increased urinary stasis and Uretherovesical reflux additionally, the physiological increase in plasma volume during pregnancy decrease urine concentration up to 70% which may develop glycosuria ,that encourage bacterial growth in urine(Patterson and Andriol 1987). On the other hand, the increase in urinary progesterin's and estrogen hormones may lead to decrease the ability of lower urinary tract to resist invading bacteria (Lucas, and Cunningham, 1993). Using data from National Birth Defects Study Population from (41,869 women) found that 11%- 26% of women reported being diagnosed and / or



treated for UTI during pregnancy (Johnson, *et al.*, 2021). Untreated asymptomatic or symptomatic UTIs are associated with negative outcomes for both mother and baby (Azami *et al.*, 2019), which include pyelonephritis, which can progress to sepsis necrotizing infection and acute renal failure in pregnant women (Belyayeva and Jeong, 2022)

As the name indicates, the infected urinary tract parts coming in different region and symptoms, upper and lower urinary tract. The infection is named after the part gets infected and is referred to as cystitis (bladder infection) and phylonephritis (kidney infection). The symptoms associated with the bladder and kidney infections are contrasting that includes painful and frequent urination, in case of cystitis as a result of bladder infection. Whereas conditions like high fever and flank pain are commonly experienced, in case of kidney contagion which is referred to as Phylonephritis (Tanvi, *et al.*, 2024). Bacteria are the prime perpetrator responsible for conferring the infection among humans of UTI, but the role of certain fungi and viruses cannot be over looked. However, the incidence of UTI as a result of viral or fungal infection is considered to be rare phenomena (Sheikh, *et al.*, 2000).

The infection of urinary tract seems to be not harmless in initial stages, then, the patient shows a variety of symptoms as the stage progresses and can lead to death in severe circumstances (Parveen, *et al.*, 2011) (Demilie, *et al.*, 2012) Urinary tract infection can be a consequence of poor diagnosis and is regarded as the common hospital acquired infection. (Kolawole *et al.*, 2009) (Koffuor, *et al.*, 2012) The infection encompasses a diverse group of clinical syndromes and diseases that differ in epidemiology, etiology, location and severity of the condition.(Lucas, *et al.*, 1993) The onset of the infection in pregnant, is in the 6th week of pregnancy through 24th week (Rahimkhani *et al.*, 2008) Although the



prevalence of Bacteriuria during pregnancy is similar to that in non-pregnant women, pregnancy enhances the possibility of infection among women.(Dafnis, *et al.*,1992) The occurrence of the infection is at its peak during pregnancy which in turn relies on several other factors.

The diagnosis of UTI may be made on the basis of clinical sign and symptoms in combination with urinary results. The urine culture remain as important test in diagnosis of UTI, to determine type of infection (Stam, *et al.*, 1993) (Wing, *et al.*, 2000). The aim of current study is to scope chemical, physical and microscopic tests for pregnant women with UTI in addition to bacterial test drug resistant profile that associated with such infections among pregnant women attending the Specialized Hospital for Maternity. (Al- Elywiah Public Hospital – Baghdad / Iraq).

Materials and Methods

Study sample

A total of 70 pregnant women with age ranging from 18 – 39 years were subjected to study after obtaining their consent, the pregnant women were admitted in **Al Elywiah Maternity Hospital** (public hospital) during period from December 2024 to April 2025. Urine samples for analysis were collected from pregnant patients in sterile container that follow up in hospital, all study cases, analysis and culture were used for the detection of UTI infection.

Sampling collecting

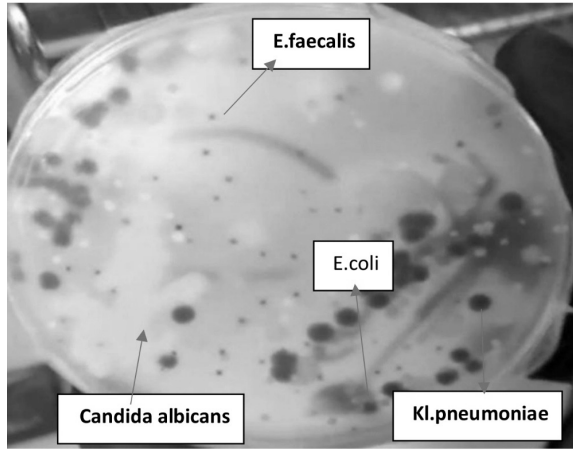
A sample of urine of clean catch mid –strem specimen used to minimize contamination with normal flora of genitourinary tract (Betty, *et al.*, 1998)



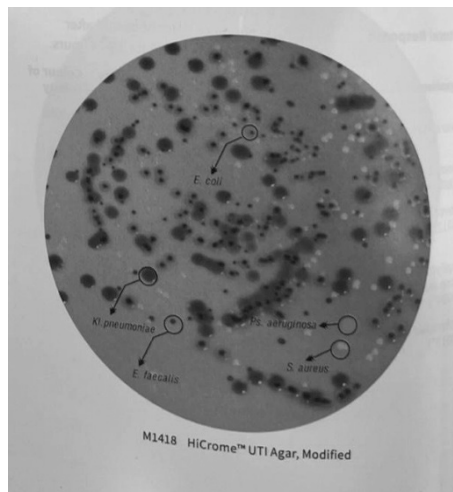
(All women were instructed how to give a clean catch midstream sample. Briefly, they were asked to clean the area around urethral opening with clean water and alcohol swab, then dry and collect sample by discarding the first part of urination and collect 10-20 ml of midstream in clean sterile disposable container, each sample carry information for pregnant patient's name and age. each sample was divided into two parts were carry for lab analysis.

Urine analysis

The urine samples were divided in two part, for the first part, different analysis were carried out for each sample starting by physical test which include (color, clarity and odor), while chemical test examined by dipstick ,10 reagent test strip (CYBOW 10, Gimhee, Kora) that have panels to detect glucose, Bilirubin, Ketones, specific gravityetc. (smith, 2003). Furthermore, wet preparation was made for sedimentation (using centrifugation at 5000 rpm for 5 minute), in Ultra centrifuge (Heltich Zentrifugen/EBA20). Than urine sample were microscopy examined at 40x for detection of WBC, RBC crystals and Amorphous types. While, the second part of the urine sample was cultured on plates with media, these media are modifications of HiCrome™ UTI Agar, which can be used in place of MacConkey Agar for isolation, and confirmation of various microorganisms (Figures 1 and 2). It facilitates and expedites the identification of some gram negative and positive bacteria on the basis of different contrasted colony color produced by reactions of genus or species specific enzymes with two chromogenic substrates. The list of antibiotic use for urine infection examination was shown in (Table 1).



(Figure 1) HiCrome™ UTI Control agar



(Figure 2) UTI Culture media



Table 1: (Microbiology sensitivity test).

Antibacterial		
1- Amoxyclav(Aomxycillin/Clavulanic acid) (30mcg(20/10mcg)	AMC	Disc-content
2-Cefelxine		Disc-content (30mcg (
3- Cefepime CPM		Disc-content (30mcg(
4 -Ceftariaxone CTR		Disc-content (30mcg(
5- Nitrofurantoin NIT		Disc-content (100mcg (
Antifungal		
1- Nystatin NS		Disc-content (50mcg(
2- Clotrimazole CC		Disc-content (10mcg(

Results and Discussion

Prevalence of UTI among pregnant women

In this study a sample of (70) pregnant women that registers in Al Elywiah Hospital for maternity / Baghdad, medical data results taken from attended pregnant women with age range (18-39 year old). These pregnant were grouped as (18-20) , (20-23 ,..... (39-41) years ,as shown in (Table 2). Based on the clinical symptoms and doctor questioner, Out of 70 pregnant women test, about 40 women (57%) have positive symptom for urinary tract infection, patients are classified as symptomatic, and 23(33%) UTI-positive patients that associated with medical questioner classified as a symptomatic UTI. While 7 patients have negative test (Fatima and Ishrat, 2006) (Table 3).

**Table 2: Age group of pregnant women with UTI**

Age group of pregnant women (in years)	Number of cases	Percentage %
18-20	15	21
21-23	9	13
24-26	13	19
27-29	7	10
30-32	11	16
33-35	8	11
36-38	4	6
39-41	8	4
Total	70	100

Table 3: Prevalence of UTI among pregnant women

Investigated population	Asymptomatic UTI		Symptomatic UTI		TOTAL	
	No.	%	No.	%	No.	%
Pregnant women. 70	23	33%	40	57%	63	100%

Table 4: Physical examination (color, appearance, odor) of urine of pregnant women with UTI

Color and appearance and odor	Number of cases	Percentage %
Pale yellow to clear odorless	8	11
Yellow to clear odorless	23	33
Yellow to cloudy or turbid foul smell	33	47
Dark or deep yellow to turbid foul smell	2	3
Reddish yellow to cloudy foul smell	4	6
Total urine of	70	100

Result of physical examination showed that samples color of urine range from pale yellow, yellow to dark with turbid except two samples show reddish color (Table 4). The turbid samples may refer to infection by different source like bacteria or amorphous.



Results of chemical examination, showed that most of pregnant are negative for sugar test except three, as most of pregnant are young in age, they have no diabetic and 2-3 have pregnant diabetic, also specific gravity showed highly positive in results for most pregnant which mean that most of them have infection with different type of amorphous and crystals, as they have some symptom in difficult urination and effect their health as shown under microscope (Chateen, *et al.*, 2007), while results for bilirubin showing normal for all sample except two sample, test for nitrite shows positive for (11) sample, which mean these women had infection with negative bacteria, while leukocyte esters showed positive in some sample (Table 5).

Results of microscopic examination showed RBC and Pus cells from (5-30 HPF) in the most sample. (Tables 6, 7 and 8).

Table 5: Some Chemical examination (Urobilinogen, Bilirubin, Glucose...etc.) by reagent strip test of urine of pregnant women with UTI

Test	Number of cases			Percentage %		
	Present	Absent	Total	Present	Absent	total
Urobilinogen	1	69	70	1	99	100
Bilirubin	2	68	70	3	97	100
Glucose	3	67	70	4	96	100
Ketones	3	67	70	4	96	100
Blood	27	43	70	39	61	100
Nitrite	11	59	70	16	84	100
Leukocyte esterase	35	35	70	50	50	100
Protein	26	44	70	37	63	100



Frequency of UTI-associated microbial agents

Out of the 70 UTI pregnant women study, it was found that *Enterococcus faecalis* was the most frequently isolated pathogen, it's about (40%) followed by *Staphylococcus aureus* (34%). On the other hand, *E. faecalis* and *Staph. aureus* were the most frequently isolated pathogens (25% each) from the 23 UTI cases (Table 9) (Figure 2) (Al-Dujaily, 2000) (Akerelle, *et al.*, 2001) (Yveline, *et al.*, 2023) Smail *et al.*, (2019),",

Results showed that *Candida albicans* fungi was found in two samples only, The sensitivity test of bacteria, results showed that antibiotics *Cefepime*, *Nitrofurantion* and *Ceftarioxone* are the most effective in bacteria which shows sensitive, also *Amoxyclav* shows intermediate in more samples, While *Cefalexin* is resistant in most samples .(Awaness *et al.*, (2000)(Table 10).

Tables: 6 & 7 Represents Pus cells and RBCs analysis by microscopic examination (40X) of urine of pregnant women with UTI

Pus cells/HPF	Number of cases	Percentage %
0-2	40	57
3-5	8	11
6-8	6	9
9-11	11	16
Numerous >11	5	7

HPF\RBCs	Number of case	Percentage%
0-5	48	69
6-10	12	17
Numerous>10	10	14
Total	70	100



Table 8: Represents Crystals, Mucus and Fungal analysis by microscopic examination (40X) of urine of pregnant women with UTI

	Number of cases	Percentage %
Crystal		
Present	43	61
Absent	27	39
Mucus		
Present	30	43
Absent	40	57
Fungi		
Present	4	6
Absent	66	94
Total	70	100

Table 9: Number of bacterial and fungal culture cases using (UTI agar)

	Number of cases	Frequency %
Bacteria		
<i>Escherichia coli</i>	6	9
<i>Proteus mirabilis</i>	0	0
<i>Kelbsiella pneumoniae</i>	5	7
<i>Pseudomonas aeruginosa</i>	0	0
<i>Enterococcus faecalis</i>	28	40
<i>Staphylococcus aureus</i>	24	34
Fungi		
<i>Candida albicans</i>	4	6
Total	70	100

**Table 10: Antibiotics examination**

antibiotics	Discontent	Sensitive	intermediate	Resistant
Amoxyclav (Aomxycillin/ Clavulanic acid) AMC	30mcg	34	28	1
Cefalexin CN	30mcg	23	20	20
Cefepime CPM	30mcg	43	12	8
Ceftariaxone CTR	30mcg	44	16	3
Nitrofurantoin NIT	100mcg	46	15	2

Discussion

The aim of the present study was to investigate the infection of urinary tract among pregnant women attending *Al Elywiah Hospital for Maternity-Baghdad / Iraq*.

The study revealed that the frequency of symptomatic UTI in present sample about 57% (40) (Table 2) while the asymptomatic patients about 33% this finding is smaller to results finding by Chateen and his coworkers (2007) in Kirkuk city, Iraq.

Also Results of chemical examination by dipstick, showed that most of women have negative sugar test except two, as they are young in age, for diabetic ,they are normal or it my related to pregnant diabetic, also specific gravity showed high positive results for all women which mean that most of pregnant have different type of amorphous and crystals that effect medically in pregnant ,as most of them felling difficulty in urination and some fell pain in a part of urinary system, while results for nitrite test shows ten samples positive result, this result was similar to results carried by Hani,2013.which its sign for infection. From the data obtained it is found that *Enterococcus faesialis* had highest frequency (40%) followed by *Staphylococcus aureus*



(28%), *E. coli* and *Klebsiella pneumonia*, other researcher has found that *E. coli* have higher frequency about (55.1%). while *Pseudomonas aeruginosa* and *Acetobacter baumannii* give negative test (Chateen *et al.*, 2007) (Ranganathan ,2014), also results showed that fungi of *Candida albicans* had (6%) frequency. (Fisher *et al.*, (2011) which related to many environmental factors.

In this study, maximum number of UTI cases is 15% that found in the group (18-20) years of age (young patients) followed by (24-26) age group 13% , the high incidence of UTI in young reproductive age group is due to early pregnancy particularly in remote setting (Emmanuel , 2023) ,also similar results showed by Naziz 2020 ,or this high frequency ,may due to an increased sexual activity in this age or, it may related to other environmental factors, like region or Socio-economic factors (Lucas,1993)(Emmanuel, 2023). The antibiotic sensitivity studies revealed that Cefepime, Nitrofurantion and Ceftriaxone antibiotics are most effective in bacteria and most useful antibiotic for treatment of UTI followed by Amoxyclav which shows intermediate effective in more samples, while Cefalexin antibiotic give resistant in most sample respectively, this results little differ from studies carried by (Hani, *et al.*, 2013),also this study are differ from studies and findings in Caucasian women where ampicillin and Sceptin remain the most useful antimicrobial agents(Ronald *et al.*, 1987), while, Chateen and his coworkers in 2007, found the most effective antibiotic was Nalidixic acid on *E. coli* and *Proteus mirabilis*, while Amoxicillin and Ampicillin were effective on *Staphylococci*.

The current study results show that urinary tract infection in pregnancy women is a vary frequent medical problem along the 9 months of maternity



and symptom are good markers to treated UTI infection, also the current finding highlight is the need to identify the specific pathogens in different population to commonly use specific antibiotic to prevent extra problem to women and baby.

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