

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

186,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



# Breakthrough Host Defense: UTI in Pregnant Women in Comparision to Non-Pregnant

*Muhamed Ali Al Kabe and Eman Th. Nadhaif Al-Fatlawy*

## Abstract

Urinary tract infections (UTIs) are common in pregnant women and provide a substantial therapeutic challenge due to the high potential of serious effects for both the mother and the baby. Pregnancy affects the urinary system physiologically, anatomically, and functionally, which can lead to infections emerging from the urethra. Unlike the general population, all pregnant women should have their urine cultures examined for bacteriuria, and any cases of asymptomatic bacteriuria should be treated, as it is a major risk factor for pyelonephritis in this group. Both the mother and the fetus should be safe from the antibiotic administered. To determine the prevalence of UTI in pregnancy in compare to non-pregnant woman in Wasit province to roll out the impact of pregnancy on the frequency of UTI. A case-control study between 2019 July and 2019 September was carried out on 30 pregnant women in compare to 30 matched non pregnant women were attending Al-Zahraa teaching hospital. A randomized (Every member of a population has the same probability of being picked for the sample, as do all possible samples of a given size) age, employment, present history, previous history, obstetric history, sex partner, frequency of sexual intercourse, and peeing frequency were all analyzed separately utilizing a plate form questioner. Urine samples, as well as a regular urine examination and urine culture, were obtained from the women who were being studied. Bacteriouria was shown to be prevalent in 13.3% of women, 16.7% of pregnant women, and 10% of non-pregnant women in this research. Asymptomatic bacteriuria in all women was 5/60 cases 8.3%. This indicates that about 16.7% of pregnant women are at risk of development of acute episode of UTI during pregnancy if they are not properly treated. In pregnant women, urinary tract infections (UTIs) are still a prevalent concern, particularly in the second trimester. During the prenatal period, urinalysis is necessary for all pregnant women. Early diagnosis and treatment of asymptomatic bacteriuria will be aided by the screening, preventing complications for both mother and child. The most prevalent risk factors for UTI during pregnancy were poor personal cleanliness, a history of UTI, diabetes mel-litus, and anemia. As a result, the study suggests that pregnant women get health education on personal sanitary cleanliness, be advised not to overuse antibiotics, and undergo frequent comprehensive urine analysis.

**Keywords:** pregnant woman, nonpregnant women, bacteriuria, UTI, hygiene

## 1. Introduction

When compared to non-pregnant women, the risk of urinary tract infection (UTI) with bacteriuria increases considerably during pregnancy. Infection with bacteriuria during pregnancy has been linked to an increased risk of pyelonephritis [1]. Several physiological changes occur during normal pregnancy, including an increase in the volume of vascular and interstitial of the renal system, which results in a rise in kidney dimension of roughly 1 cm and a 30% rise in renal volume. In addition, by mid-pregnancy, around 80% of women will have dilated upper urinary tracts, ureters, pelvis, and calycul area. The right side of the body experiences dilation more frequently than the left [2]. Hydronephrosis and hydroureter, respectively, are dilations of the kidney and ureter that occur most commonly during the second trimester and last until birth. This dilation can be caused by both hormonal and mechanical factors; an increase in progesterone hormone levels causes a decrease in bladder and ureteral tone [3]. Urinary stasis was caused by mechanical causes such as gravid uterine compression paired with smooth muscle relaxation, which slowed ureter peristalsis and increased bladder volume capacity. Pregnancy-induced alterations in urine pH, osmolality, and glycosuria may further amplify bacterial growth [2]. Symptomatic infections (acute cystitis, acute pyelonephritis) occur when bacteria invade urinary tract tissues and trigger an inflammatory reaction, whereas asymptomatic bacteriuria (ASB) occurs when bacteria grow in urine without presenting symptoms of acute UTI [1]. Asymptomatic bacteriuria is more common in pregnant women than in non-pregnant women, and it is frequently underreported since diagnosis is difficult owing to the lack of particular symptoms or signs, whereas symptomatic bacteriuria creates no concerns because diagnosis and treatment are simple [1]. The most prevalent medical complication during pregnancy is urinary tract infection (UTI), which accounts for 20% of pregnancies and 10% of antepartum hospitalizations [4–6]. The most common bacterium that causes UTI in pregnant and nonpregnant women is *Escherichia coli* [7]. Preterm delivery is more common when the bacterium group B-streptococcus is infected, and when antibiotics are used often to treat UTIs caused by other organisms [8]. Other variables that contribute to an increase in UTI during pregnancy include a narrow urethra and closeness to the anus and vagina. Wesley [9] and the inability of women to completely empty their bladder. Lower socioeconomic groups have a higher incidence [9]. The risk is also reported to be increased by sexual activity and some contraceptive techniques [10]. Because of the physical link between the female urethra and the vagina, it is susceptible to damage during sexual intercourse and microorganisms being massaged up the urethra into the bladder during pregnancy/childbirth [11, 12]. Urinary tract abnormalities or stones, diabetes, immunosuppression, and a history of UTI all enhance the risk [13, 14]. It has severe consequences for both the unborn infant and the mother. Acute pyelonephritis, poor neonatal weight, and premature birth are all elevated risks, as is the risk of pre-eclampsia [1, 15], maternal anemia, hypertension, phlebitis, and thrombosis. Some bacteria can cause uterine contraction and cervix tearing by producing inflammatory mediators (phospholipase A2, arachidonic acid, and prostaglandins) [16]. Early detection and treatment of UTI has been linked to a better pregnancy outcome and a lower incidence of acute pyelonephritis, underscoring the need of screening all pregnant women regardless of symptoms. Although urine culture is regarded as the gold standard test, it takes a long time to complete. Several fast screening assays are now in use, however the data supporting their effectiveness is of poor quality. However, it has been found that combining them is a reliable option with sensitivity and specificity equivalent to urine culture. **Objective:** This study has been carried out to determine prevalence rate of urinary tract infection in pregnancy in compare to non-pregnant woman and to roll out the impact of pregnancy on the frequency of UTI.

## **2. Material and methods**

### **2.1 Study design**

This case–control research comprised 30 pregnant women and 30 non-pregnant women who visited Al-zahraa Teaching Hospital's outpatient clinic on a regular basis. As a result of a randomized selection (where every member of a population has an equal probability of being included in the sample and where all feasible samples of a given size have an equal probability of being chosen), selected participants were assessed individually using a plate form questioner and agreed to participate in this study for three months, starting in July and ending in September 2019.

### **2.2 Sampling technique and data collection**

Women who visited the al-Zahraa teaching hospital's outpatient clinic, pregnant or not, were asked to provide their verbal agreement. For roughly 10 minutes, each woman was interrogated (Women who declined to participate were not questioned, and the next lady was chosen). Age, mother socioeconomic circumstances, obstetrical history, medical history, and patient complaint are all taken into account in the case history. Patients were taught how to collect urine samples in a sterile urine container under aseptic circumstances and then send them for a general urine examination. The sample was then given a name, a number, and was quickly taken to the lab for additional analysis.

### **2.3 Statistical analysis**

Data of this study were statistically analyzed using IBM SPSS version 22.0 and descriptive statistic was used to summaries the data, like tables, figures, and measures of central tendency. Analytic statistics were used to compare between the variables. Chi-square ( $\chi^2$ ) was used, significance was assumed at  $p \leq 0.05$ .

### **2.4 Ethical aspects**

The Ethical Committee of Wasit University's College of Medicine examined the study protocol and approved it.

## **3. Results**

### **3.1 Description of the studied population**

In this study the prevalence of bacteriuria in women was found to be 13.3%, in pregnant women 16.7% and in non-pregnant women 10%. Asymptomatic bacteriuria in all women was 5/60 cases 8.3%. This indicates that about 16.7% of pregnant women are at risk of development of acute episode of UTI during pregnancy if they are not properly treated [17, 18].

## **4. Discussion**

In this study the prevalence of bacteriuria in women was found to be 13.3% (8/60), in pregnant women 16.7% (5/30), and in non-pregnant women 10% (3/30). Asymptomatic bacteriuria in all women was 8.3% (5/60), in pregnant women was 11.7% (4/30), and in non-pregnant women was 5% (2/30). This indicates that about

16.7% of pregnant women are at risk of development of acute episode of UTI during pregnancy if they are not properly treated. These findings are similar to that of Uncu who reported the prevalence of asymptomatic bacteriuria in pregnant women 9.3% [19]. In a study performed in turkey, the prevalence of asymptomatic bacteriuria was reported to be 8.1% [20]. The results of the present study found significantly high relation between age and bacteriuria ( $p = 0.00$ ) (**Table 1**) and revealed that the bacteriuria in women was commonest in the age group 25–30 years 62.5%, and these result agreed with study by Buzayan in Libya [21], but contrast with study in Yemen that observed the bacteriuria was more in the age group 15–24 years 53.7% [22]. The difference may be due to social factors such as early age of marriage and sexual activity. There is no significant relationship between level of education and bacteriuria ( $p = 0.147$ ) (**Table 2**), the prevalence of bacteriuria was 30.8% in illiterate, 18.5% in primary, 11.1% in secondary and 5.7% in university level of education However, as the level of education increases there is decrease in bacteriuria among women and these findings are similar with Samad [23]. The prevalence of bacteriuria was 14.7% in married women, and 8% in unmarried women, differences are founded apparently but no statistical difference ( $p = 0.562$ ) (**Table 2**), while Krcmery et al., showed that the risk factors for bacteriuria

Bacteriuria	Cases with Bacteriuria		Cases without Bacteriuria		Total	
	NO	%	NO	%	NO	%
Age / year	$X^2 = 13.744$ df = 4 $p = 0.0001$ S					
18–24	1	18.75	8	15.3	9	15.8
25–30	5	62.5	11	22.1	16	27.5
31–36	1	6.25	18	34.7	19	30.8
37–42	1	12.5	10	18.3	11	17.6
43–48	0	0	5	9.6	5	8.3
Total	8	13.3	52	86.7	60	100

**Table 1.**  
The distribution of cases of bacteriuria according to the age of the studied groups.

Level of Education	Cases with Bacteriuria		Cases without Bacteriuria		Total	
	NO	%	NO	%	NO	%
	$X^2 = 5.999$ df = 3 $p = 0.147$ N.S.					
Illiterate	2	30.8	5	69.2	7	10.8
Primary	3	18.5	11	81.5	14	22.5
Secondary	2	11.1	20	88.9	22	37.5
University	1	5.7	16	94.3	17	29.2
Marital status	$X^2 = 0.304$ df = 1 $p = 0.562$ N.S.					
Married	7	14.7	40	85.3	47	100
Un married	1	8	12	92	13	100
Total	8	13.3%	52	86.7%	60	100%

**Table 2.**  
The distribution of cases of bacteriuria in the studied population according to their education level, marital status and UTI.

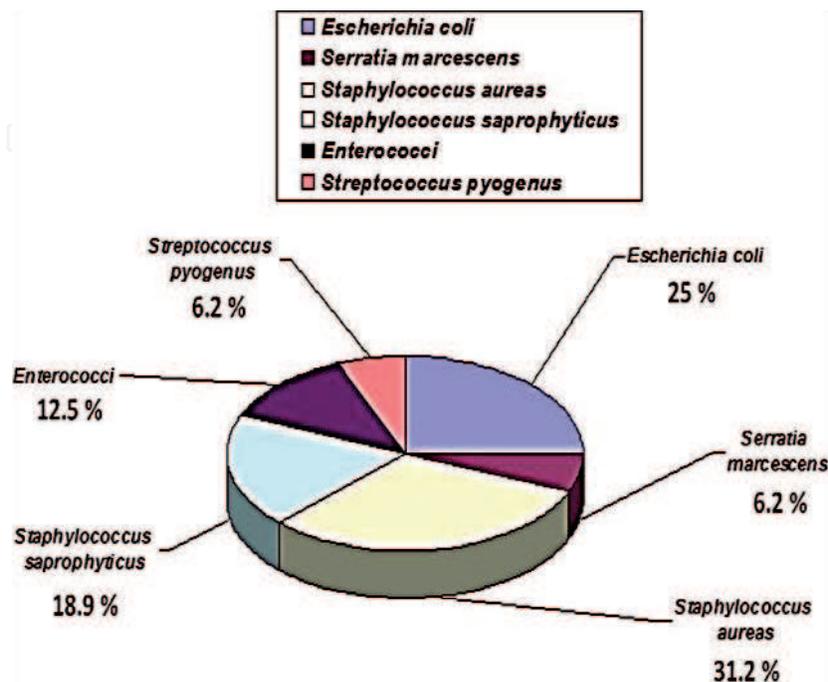
in women include sexual intercourse and having a marital history [24] (**Table 3**). The bacteriuria in the pregnant women was observed more in the third trimester 21.4% than in the first trimester 6.3%, and second trimester 20%. But no significant ( $p = 0.423$ ) (**Table 4**). Similar with Haddad who found that the bacteriuria was more

Bacteriuria	Symptomatic Bacteriuria		Asymptomatic Bacteriuria		Cases without Bacteriuria		Total	
	NO	%	NO	%	NO	%	NO	%
Pregnancy	$X^2 = 1.754$ $df = 2$ $p = 0.416$ N.S.							
Pregnant	1	3.3	4	13.3	25	83.4	30	100
Non Pregnant	2	6.7	1	3.3	17	90	30	100
Total	3	5	5	8.3	52	86.7	60	100

**Table 3.**  
 The distribution of cases of bacteriuria in relation to the pregnancy and UTI conditions.

Bacteriuria	Cases with Bacteriuria		Cases without Bacteriuria		Total	
	NO	%	NO	%	NO	%
Pregnancy Trimester	$X^2 = 1.719$ $df = 2$ $p = 0.423$ N.S.					
First Trimester	1	6.3	15	93.7	16	26.7
Second Trimester	6	20	24	80	30	50
Third Trimester	3	21.4	11	78.6	14	23.3
Total	10	16.7	50	83.3	60	100

**Table 4.**  
 The distribution of cases of bacteriuria in relation to the pregnancy age and UTI.



**Figure 1.**  
 The percentage of isolated bacteria responsible for bacteriuria.

in the third trimester 48.8% [22]. In contrast Buzayan [21], in this study the most frequent isolates were *Staphylococcus aureus* (31.2%), *E.coli* (25%), *Staphylococcus saprophyticus* (18.9%), *Enterococcus* species (12.5%), *Streptococcus pyogenes* (6.2%) and *Serratia marcescens* (6.2%) (**Figure 1**), whereas another Libyan study found that the bacteriuria in pregnant women caused by *E.coli* 65.5% and *Klebsiella pneumonia* 20.7% [21], and Haddad found *E.coli* was most frequently isolated 41.5%, followed by *Staphylococcus aureus* 19.5% [22]. The result of this study agreed with that of Oyagade et al. who found that the microbiological culture of urine samples from 502 pregnant women resulted in the isolation of bacteria, which were *Staphylococcus aureus* 21.3%, *E.coli* 16.0%, *Staphylococcus* spp. 14.7% [19]. The most effective antibiotics tested on the isolated bacteria were gentamycin (GN) 87.5%, azithromycin (AZM) 75% and ciprofloxacin (CIP) 68.75%, and the less effective antibiotics were cephalexine (CL) 6.25%, and ampicillin (AMP) 12.5%. The results of this study agreed with other studies which stated that urine culture is the gold standard method of diagnosis for bacteriuria. It's shown that urine dipstick testing, urinalysis, and enzymatic urine screening tests can poorly detect all the culture positive bacteriuria cases in women [20, 23].

## 5. Conclusion

The results of this work indirectly supported the hypothesis of an association of bacteriuria with age and gravidity. In addition, UTI appears to be multifactorial. A screening for bacteriuria in women especially pregnant women must be done to discover the infected cases, which would allow early treatment to avoid the complications.

## 6. Recommendation

The most prevalent risk factors for UTI during pregnancy were poor personal cleanliness, a history of UTI, diabetes mellitus, and anemia. The study recommends training in personal hygiene and health education about the type and frequency of changes in underwear, the number of showers per week, the use of soap, and the use of water to wash genitalia, genital dries, the frequency of micturition, precoital washing, postictal washing, and precoital micturition.

## Acknowledgements

I would like to express my gratitude to the O&G seniors at the outpatient's clinic in the Al Zahraa teaching hospital for their great assistance in achieving this research, along with al zahraa teaching hospital internal laboratory staff for their role in conducting GUE and urine culture for each participant in this study.

IntechOpen

## Author details

Muhamed Ali Al Kabe<sup>1\*</sup> and Eman Th. Nadhaif Al-Fatlawy<sup>2</sup>

1 Medical Microbiology and Immunology Department, Faculty of Medicine,  
Wasit University, Iraq

2 Laboratory and Clinical Sciences Department, Pharmacy College,  
Kufa University, Iraq

\*Address all correspondence to: [malkaabi@uowasit.edu.iq](mailto:malkaabi@uowasit.edu.iq)

## IntechOpen

© 2021 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

## References

- [1] Schnarr J, Smaill F. Asymptomatic bacteriuria and symptomatic urinary tract infections in pregnancy. *Eur J Clin Invest* 2008;38 Suppl 2:50-57.
- [2] Jeyabalan A, Lain KY. Anatomic and functional changes of the upper urinary tract during pregnancy. *Urol Clin North Am* 2007;34:1-6.
- [3] Parveen K, Momen A, Begum AA, Begum M. Prevalence of urinary tract infection during pregnancy. *J Dhaka Natl Med Coll Hosp* 2011;17:8-1.
- [4] Alemu A, Moges F, Shiferaw Y, Tafess K, Kassu A, Anagaw B, et al. Bacterial profile and drug susceptibility pattern of urinary tract infection in pregnant women at university of Gondar Teaching Hospital, Northwest Ethiopia. *BMC Res Notes* 2012;5:197.
- [5] Tadesse E, Teshome M, Merid Y, Kibret B, Shimelis T. Asymptomatic urinary tract infection among pregnant women attending the antenatal clinic of Hawassa Referral Hospital, Southern Ethiopia. *BMC Res Notes* 2014;7:155.
- [6] Vasudevan R. Urinary tract infection: An overview of the infection and the associated risk factors. *J Microbiol Exp* 2014;1:8.
- [7] Olds SB, Ladewig W, Davidson MR. *Maternal Newborn Nursing and Women's Health Care*. 7th ed. United States of America: New Jersey; 2004. p. 120-122.
- [8] Allen VM, Yudin MH, Bouchard C, Boucher M, Caddy S, Castillo E, et al. Infectious Diseases Committee, Society of Obstetricians and Gynaecologists of Canada. Management of group B streptococcal bacteriuria in pregnancy. *J Obstet Gynaecol Can* 2012;34:482-486.
- [9] Wesley WE. Urinary tract infection. *Females Med J* 2002; 3:33-41.
- [10] Bandyopadhyay S, Thakur JS, Ray P, Kumar R. High prevalence of bacteriuria in pregnancy and its screening methods in North India. *J Indian Med Assoc* 2005; 103: 259-262, 266.
- [11] Arthur LB, Smith PB, Marvin T. Clinical consideration; laboratory diagnosis of UTI. 1975; USA, 2:1-4.
- [12] Duerden BI, Reid TMS, Jewsbury JM, Turk. *A New Short book of Medical Parasitic Infection*. DC 1990; ELBS Publishers. 576- 582.
- [13] Patterson, T.F. and V.T. Andriole, Detection, significance and therapy of Bacteriuria in pregnancy; update in the managed health care era. *Infect. Dis. Clin. North Am.* 1997; 11: 593-608.
- [14] London: WB Saunders, 1999; 559: 559-98.
- [15] Bolton M, Horvath DJ Jr., Li B, Cortado H, Newsom D, White P, et al. Intrauterine growth restriction is a direct consequence of localized maternal uropathogenic *Escherichia coli* cystitis. *PLoS One* 2012; 7:e33897.
- [16] Randis TM, Gelber SE, Hooven TA, Abellar RG, Akabas LH, Lewis EL, et al. Group B streptococcus  $\beta$ -hemolysin/cytolysin breaches maternal-fetal barriers to cause preterm birth and intrauterine fetal demise in vivo. *J Infect Dis* 2014; 210:265-273.
- [17] Uncu Y; Uncu G; Esmer A and Bilgel N. (2002), Should asymptomatic bacteriuria be screened in pregnancy? *Clin. Exp. Obstet. Gynecol.* 29:281-285.
- [18] Tugrul S; Oral O; Kumru P; Kose D; Alkan A and Yildirim G. (2005). Evaluation and importance of asymptomatic bacteriuria in pregnancy. *Clin Exp Obstet Gynecol.* 32:237-240.

[19] Oyagade AO; nSI Smith; and O Famurewaf. (2004). Asymptomatic significant bacteriuria among pregnant women in ADO-EKIT Ekit Sstate, Nigeria, African Journal of Clinical and Experimental Microbiology Vol.5, No.1.

[20] Teppa RJ and Roberts JM. (2005). The uriscreen test to detect significant asymptomatic bacteriuria during pregnancy. J Soc Gynecol Investig. 12:50-53.

[21] Buzayan Muna Mohamed. (1998) A study of bacteriuria during pregnancy in Benghazi women. Benghazi university. (Unpublished thesis).

[22] Al-Haddad A.M. (2005) Urinary tract infection among pregnant women, Eastern Mediterranean Health Journal, Vol 11 No 3:505- 510.

[23] Samad Hazhir. (2007) Asymptomatic bacteriuria in pregnant women, Urology Journal Vol 4 No1.

[24] Krcmery S; Hromec J and Demesova D. (2001) Treatment of lower urinary tract infection in pregnancy. Int J Antimicrob Agents, 17(4):279-282.