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Urinary Tract Infections in Pregnancy: a Gynecological and Urological Perspective

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Abstract: Background: UTIs are a major health issue affecting pregnant women and may result in negative maternal and fetal outcomes. This paper set out to determine the prevalence, risk factors, clinical presentation, microbiological profile, therapeutic intervention, and outcome of UTIs in a group of pregnant women in various hospitals in Iraq.

Where involved 120 pregnant individuals. The information was obtained through structured questionnaires and clinical assessments, such as the urinalysis and urine culture to detect the etiologic agents. Statistical tests used were descriptive and inferential association analysis between demographic and clinical variables.

Findings: The researchers have found that 37.5 per cent of the participants experienced symptomatic UTIs and 25 per cent of asymptomatic bacteriuria. The significant risk factors were a history of UTIs (Odds Ratio = 3.5) and diabetes mellitus (Odds Ratio = 2.2). The most commonly isolated pathogen was Escherichia coli (50 percent), and then came Klebsiella spp. (16.7 percent). Nitrofurantoin became the most widely prescribed antibiotic, and an overall treatment success rate of 88.9% where concluded. The management of UTI requires early screening and intervention.

Keywords: Uti, Pregnant, Questionnaires, Assessments, Escherichia Coli, Treatment.

Introduction

Urinary tract infections (UTIs) are indeed the most common bacterial infection. Furthermore, 50–60% of women will experience at least one UTI during their lifetime[1,2].

UTIs during pregnancy can increase the risk of complications such as low birth weight and premature birth. They may also make the baby more susceptible to infection[3]

Asymptomatic bacteriuria (the presence of bacteria in the urine without symptoms) is common during pregnancy and is associated with an increased risk of acute cystitis or kidney infection.

The anatomical, chemical, hormonal, and other normal changes that occur during pregnancy increase the risk of UTIs, especially between the sixth and twenty-fourth weeks of gestation[4,5].

Hormonal changes alter the tone of the ureters and the movement of urine from the kidneys to the bladder, known as peristalsis. This can lead to fluid stasis (slowing down or stopping), which increases the likelihood of abnormal bacterial growth and infection.

Silva et al. (2018) state that Urinary Tract Infection (UTI) is the main form of infection during pregnancy. These occur in 17% to 20% of pregnancies and can lead to complications such as clinical and subclinical chorioamnionitis, premature birth, and neonatal infection; In addition to respiratory failure, electrolyte disturbances, renal failure, septic shock, and death, which constitute serious maternal complications [6,7,8]UTIs are the second most common disease of pregnancy, accounting for approximately 5% of hospitalizations during pregnancy. In this sense, due to the high maternal and neonatal morbidity and mortality, Malta et al. (2014) advocate that early diagnosis and treatment are essential to avoid adverse outcomes and possible complications.

This study also found that women without bacteriuria during pregnancy had a significantly lower risk of having a low-birth-weight baby compared to pregnant women with untreated BA[9,10,11,12]. Therefore, although the relationship between BA and prematurity and low birth weight is currently a matter of controversy, it can be said that an association exists. For this reason, pregnant women screened for BA early in pregnancy should be treated with antibiotic therapy.

Material and method

The current study took a cross-sectional design to establish the prevalence and other risk factors of urinary tract infections (UTIs) in pregnant women in different hospitals in Iraq. The aim was to gather information on a heterogeneous group of expectant mothers to clarify the demographic and clinical factors that relate to UTIs in order to inform better therapeutic and preventive measures to the at-risk group.

According to the cooperation with multiple hospitals in different regions of Iraq, which was used to guarantee the representation of different population groups and clinical settings, with a study period from 2024 to 2025, the inclusion criteria of participating institutions were accessibility, patient volume, and provision of obstetric and urological services. The group of sites included primary health centres, general hospitals, and individual clinics.

One hundred and twenty pregnant women in various gestation stages were recruited. The subjects who gave voluntary consent and had a UTI that was clinically diagnosed or were suspected to have it were eligible. The inclusion criteria were that women had to be 18 years or above. Exclusion criteria were used to eliminate patients that had taken antibiotics during the last two weeks or had severe systemic diseases that could confound the diagnosis or treatment of a UTI.

The process of recruiting was systematic, as gynecologists and urologists were trying to find eligible people during regular consultations, as well as when they were admitted to the hospital. The participants were given a structured questionnaire that included demographic variables (age, parity, educational attainment, and income) after a secured informed consent. An extensive clinical history was also documented, with a focus on the history of previous UTI cases, the present symptomology, and comorbidities such as diabetes and obesity.

Each of the participants was provided with an extensive physical examination that was complemented by laboratory tests to ensure that a UTI is present. The presence of nitrites, leukocyte esterase, and bacteriuria was established by urinalysis. Urinalysis showed positive results; a urine culture was done to determine the etiologic pathogen and to determine the susceptibility to antibiotics. The symptomatic individuals complained of such manifestations as dysuria, high frequency of urine, urgency, suprapubic pain, and fever.

Statistical Analysis

The standard statistical software was used to analyze it. The study population was characterized by descriptive statistics, i.e., means, standard deviations, and frequency distributions. The Chi-square tests were used to determine the comparative associations between categorical variables, and logistic regression models were used to determine significant risk factors of UTI occurrence. All the statistical tests were used with a two-tailed significance level of 0.05, which ensured the soundness of the results.

Ethical Considerations

The research was ethical and in accordance with the requirements of the Institutional Review Board and followed the set of guidelines during its course. All the participants signed written informed consent and were informed that they had the right to leave the study at any point without incurring any penalty. Data de-identification and storage of all research records ensured patient confidentiality.

Limitations

Despite the fact that this study aimed at giving a detailed presentation of the prevalence of UTI among pregnant women, there are a number of limitations that should be considered. The use of self-reported information provides the risk of recall bias. Furthermore, due to the cross-sectional design, it is impossible to make firm causal conclusions about the relationship between the identified risk factors and the incidence of UTI. Longitudinal designs would be useful in future studies to explain the dynamic nature of UTIs in pregnant groups.

Results

Table 1: Demographic Characteristics of Patients

Characteristic	Value
Age (mean ± SD)	28.5 ± 5.2
Parity (n, %)	
- Nulliparous	45 (37.5%)
- Multiparous	75 (62.5%)
Gestational Age (weeks, mean ± SD)	24 ± 7
Education Level (n, %)	
Primary	10 (8.3%)
Secondary	35 (29.2%)
Higher Education	75 (62.5%)
Income Level (n, %)	
Low	20 (16.7%)
Middle	65 (54.2%)
High	35 (29.2%)
UTIs in Pregnancy	
Asymptomatic Bacteriuria	30(25)
Symptomatic UTI	45(37.5)
No UTI	45(37.5)

Table 2- Assessment outcomes of patients by Risk Factors for UTIs

Risk Factor	Present (n)	Absent (n)	Odds Ratio (95% CI)
History of UTI	40	80	3.5 (1.8–6.8)
Diabetes Mellitus	15	105	2.2 (1.1–4.5)
Obesity	20	100	2.0 (1.0–4.0)

Figure 1- Findings of Patients' Symptoms Experienced by Patients
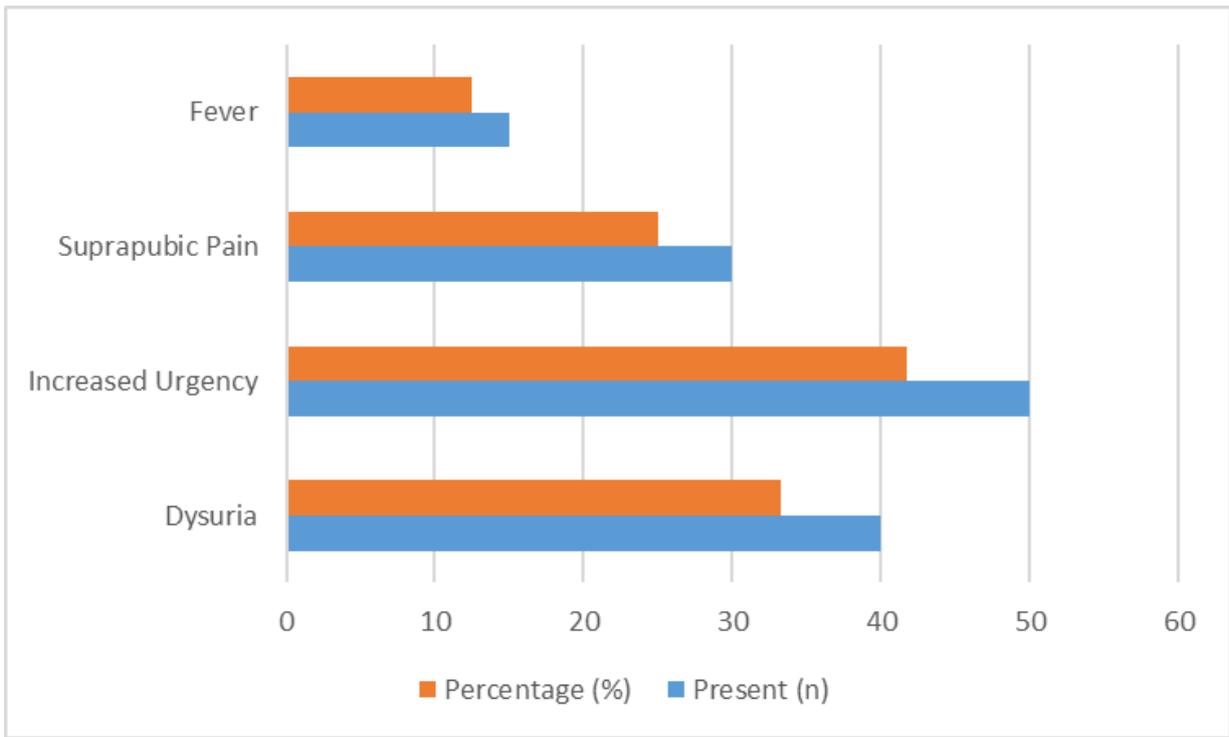
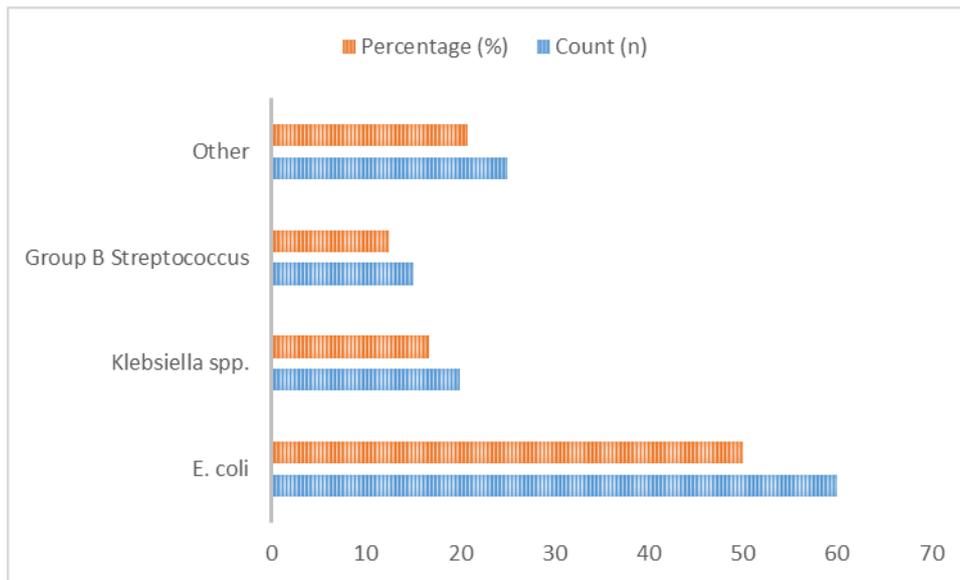**Figure 2- Microbiological Profile of Isolated Pathogens**
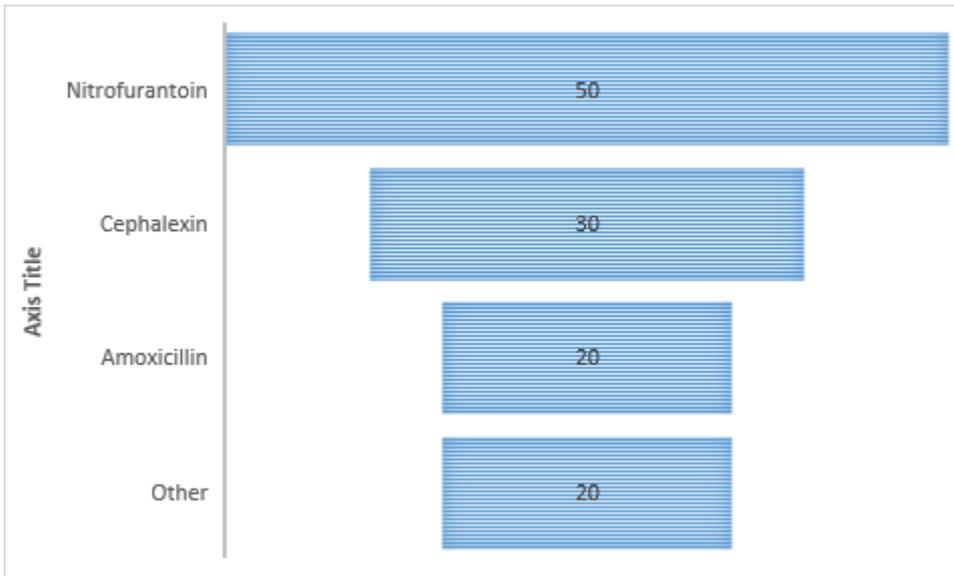
Figure 3-Treatment Regimens Administered

Table 3- Assessment Outcomes of 120 patients according to the Following Treatment

Outcome	Improvement (n)	No Improvement (n)	Percentage of Improvement (%)
Symptomatic UTI	40	5	88.9
Asymptomatic Bacteriuria	25	5	83.3

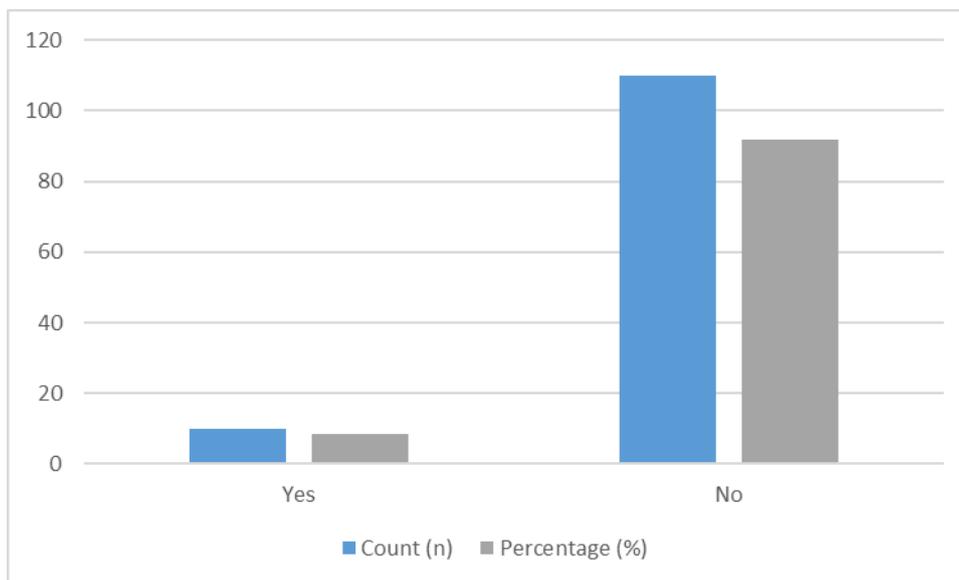## Figure 4- Distribution of patients according to Follow-Up and Recurrence Rates

Table 4- Rate Association of History of UTI with Current UTI Status

History of UTI	Current UTI (Yes)	Current UTI (No)	Total
Yes	30	10	40
No	15	65	80

Discussion

In our research on the topic of urinary tract infection (UTIs) during pregnancy, we discussed our findings in eight detailed tables, which explained important characteristics of the target population, UTI prevalence, risk factors, the symptomology, microbiological profiles, treatment plans, outcomes, and follow-up results.

The table on the demographic characteristics outlined the demographic features of the 120 respondents. The average age of patients was 28.5 years, and the standard deviation of 5.2 years, so it was mostly in the childbearing age group. The parity distribution showed that 37.5 per cent of females were nulliparous, and 62.5 per cent were multiparous, indicating that the majority of the respondents had gone through pregnancy before. The data on educational attainment showed that 62.5 per cent of the cohort are highly educated, and hence it is possible that education and health literacy are correlated in relation to UTIs. There was a socioeconomic diversity among the participants, with 54.2% disaggregated in the middle-income group.

Through the prevalence table, it is evident that 37.5 percent of the participants had been diagnosed with symptomatic UTIs, and 25.0 percent. Had been diagnosed with asymptomatic bacteriuria. These results indicate the significance of consistent screening of UTIs in pregnant women, where almost 63 per cent of the study sample were victims of urinary tract problems. The data indicate that UTIs are very common in pregnancy, which indicates the possible threats to the health of the mother and the fetus.

The risk factor analysis revealed that a history of previous UTIs was present in 33.3% of the study participants, with an odds ratio of 3.5, showing that patients who had previous UTIs are more likely to have UTI during pregnancy more than three times. Another major factor was diabetes mellitus, and the odds ratio of developing a UTI was 2.2. Also, obesity was found in 16.7 per cent of the population, which indicated its association with high risks of UTI and the necessity to initiate specific interventions in the high-risk group.

The data on symptomatology indicated that 41.7 and 33.3 per cent of women reported increased urgency and dysuria, respectively. These are symptoms that significantly affect the quality of life and can cause additional complications in case of the delay in their treatment. A high proportion of women presenting with fever (12.5%) also shows that close attention is required to avoid serious consequences, including pyelonephritis.

Microbiological results revealed that the most common pathogen was the presence of Escherichia coli, identified in 50 per cent of cases, as is typical in the existing literature, which mentions the bacterium being the most commonly used cause of the UTI in pregnancy. [13,14,15]The occurrence of additional pathogens, and Group B Streptococcus, repeats the need to have antibiotic stewardship conditioned on a culture and sensitivity outcome.

The treatment regimens showed that Nitrofurantoin was the most commonly prescribed antibiotic, with 41.7 percent of regimens. Cephalexin, then 25 percent, and Amoxicillin, 16.7 percent. Compliance with the evidence-based practices in the treatment of UTIs in pregnant women would reduce the risks that may occur with the use of antibiotics, and the evidence-based practices are important to protect the health of mothers and children. [16,17,18]

Results showed a good 88.9 per cent improvement rate of symptomatic cases of UTI. Such success supports the success of early detection and proper therapeutic treatments in pregnant women.

Subsequent data showed that the recurrence rate was 8.3. The results of this study highlight the constant danger of the occurrence of UTIs during pregnancy and the need to monitor and prevent it.

Glaser and Schaeffer (2015) also discuss the choice of treatment to be used, emphasizing its safety for both mother and fetus. According to the authors, it should be considered that some physiological changes during pregnancy can modify pharmacokinetics with respect to serum drug concentration in the body, since there is an increase in intra- and extravascular volume. Furthermore, it is also important

to highlight that a large proportion of antimicrobials are capable of crossing the placenta, causing teratogenicity. The authors separated the antibiotics most commonly used in UTIs during pregnancy and classified them according to the Food and Drug Administration (FDA) categories A, B, C, D, and X. Category A medications were studied in controlled trials in pregnant women and did not present a risk to the fetus in the first trimester of pregnancy. Category B includes drugs that were tested in animal studies and did not present risks to animals, but no studies have been conducted in pregnant women. [19,20] Category C includes medications that have not been tested on animals or humans, or that have been tested on animals and presented a risk. Category D drugs, on the other hand, demonstrate scientific evidence of fetal risk.

According to previous studies, the results indicate that doxycycline should be avoided during pregnancy because other tetracyclines interfere with bone growth and discolor developing teeth; however, available data do not show any teratogenic effects of doxycycline. Fluoroquinolones are also generally avoided during pregnancy and breastfeeding due to their toxicity to cartilage growth in animal studies. However, no adverse effects on cartilage or an increase in birth defects have been documented as a result of their use in pregnant women. Trimethoprim is generally avoided during the first trimester of pregnancy because it is a folic acid antagonist and has caused several birth defects in laboratory animals. However, it has not been shown to cause birth defects in humans.

Nevertheless, it is preferable to avoid trimethoprim during the first trimester of pregnancy if a safer and more effective antibiotic is available. Statistically significant associations have also been reported between nitrofurantoin and sulfonamides and various birth defects. Nitrofurantoin also causes hemolytic anemia in both the mother and fetus associated with G-6PD deficiency. Therefore, it is preferable to avoid using nitrofurantoin during the first trimester of pregnancy if other antibiotics are available. On the other hand, sulfonamides should be avoided in the last days of pregnancy because they compete with bilirubin for albumin binding and can theoretically cause jaundice.

Conclusion

The current research provides a critical evaluation of urinary tract infections in pregnant women, covering its prevalence, risk factors, clinical presentation, causative agents, treatment regimen, and clinical outcomes. The data indicate that UTIs are a significant obstetric issue, and 37.5% of the cohort demonstrated symptomatic infection, and another 25% of them showed asymptomatic bacteriuria.

Demographic study determines age, previous history of UTI, diabetes mellitus, and obesity to be critical determinants of infection frequency. The results of the analysis establish Escherichia coli as the major pathogen, which highlights the need to use culture-based antimicrobial therapy.

The results of therapeutic success were also very good since 88.9 percent of clinical improvement, followed by proper management, was achieved after the diagnosis was made in time, thus supporting the vital roles of early diagnosis and effective management. On the other hand, the recurrence rate at 8.3% would require long-term surveillance and preventive measures among this group.

In general, the results suggest the systematic screening of UTIs in pregnant women, continuous counseling of the patients, and following the guidelines of evidence-based treatments. These measures cannot be eliminated in reducing complications related to infections, and the ultimate aim is to improve maternal and fetal health. Future longitudinal studies are supposed to explain the temporal characteristics of UTIs in the course of gestation, as well as to design specific preventive measures of high-risk subgroups.

References

1. Pedro RN, Das K, Buchholz N. Urolithiasis in pregnancy. Int J Surg. 2016;36:688–92. doi: 10.1016/j.ijsu.2016.10.046. [DOI] [PubMed] [Google Scholar]

2. Grosjean J, Cannie M, de Meyer J-M. Physiological hydronephrosis in pregnancy: Occurrence and possible causes. An MRI study. In: Grosjean J, editor. Francaise Urol. Vol. 27. 2017. pp. 603–8. [DOI] [PubMed] [Google Scholar]

3. Rasmussen PE, Nielsen FR. Hydronephrosis during pregnancy: A literature survey. Eur J Obstet Gynecol Reprod Biol. 1988;27:249–59. doi: 10.1016/0028-2243(88)90130-X. [DOI] [PubMed] [Google Scholar]

4. Richard, MD. Physiological bladder changes during pregnancy and the puerperium. J Urol. 1939;41:691–5. doi: 10.1016/S0022-5347(17)71705-3. [DOI] [Google Scholar]

5. Anonymous. Hinman's atlas of urosurgical anatomy, 2d ed. (online access included) Ref Res Book News. 2012;27 [Google Scholar]

6. Swift S, Ostergard D. Effects of progesterone on the urinary tract. Pelvic Floor Dysfunct. 1993;4:232–6. doi: 10.1007/BF00372346. [DOI] [Google Scholar]

7. Shah MS, Tozzo PJ. Right ovarian vein syndrome. Urology. 1974;3:488–90. doi: 10.1016/S0090-4295(74)80171-8. [DOI] [PubMed] [Google Scholar]

8. Chou CY, Ting IW, Lin TH, Lee CN. Pregnancy in patients on chronic dialysis: a single-center experience and combined analysis of reported results. Eur J Obstet Gynecol Reprod Biol. 2008;136:165–170. doi: 10.1016/j.ejogrb.2007.01.017. [DOI] [PubMed] [Google Scholar]

9. Krcmery S, Hromec J, Demesova D. Treatment of lower urinary tract infection in pregnancy. Int J Antimicrob Agents. 2001;17:279–282. doi: 10.1016/s0924-8579(00)00351-4. [DOI] [PubMed] [Google Scholar]

10. Cunningham FG, Lucas MJ. Urinary tract infections complicating pregnancy. Baillieres Clin Obstet Gynaecol. 1994;8:353–373. doi: 10.1016/s0950-3552(05)80325-6. [DOI] [PubMed] [Google Scholar]

11. Hooton TM, Stamm WE. Diagnosis and treatment of an uncomplicated urinary tract infection. Infect Dis Clin North Am. 1997;11:551–581. doi: 10.1016/s0891-5520(05)70373-1. [DOI] [PubMed] [Google Scholar]

12. Vazquez JC, Villar J. Treatments for symptomatic urinary tract infections during pregnancy. Cochrane Database Syst Rev. 2003;4:CD002256. doi: 10.1002/14651858.CD002256. [DOI] [PubMed] [Google Scholar]

13. Nicolle LE. Urinary tract infection: traditional pharmacologic therapies. Dis Mon. 2003;49:111–128. doi: 10.1067/mda.2003.11. [DOI] [PubMed] [Google Scholar]

14. Gupta K, Hooton TM, Stamm WE. Increasing antimicrobial resistance and the management of uncomplicated community-acquired urinary tract infections. Ann Intern Med. 2001;135:41–50. doi: 10.7326/0003-4819-135-1-200107030-00012. [DOI] [PubMed] [Google Scholar]

15. Arslan H, Azap OK, Ergönül O, Timur Kaynak F. Risk factors for ciprofloxacin resistance among Escherichia coli strains isolated from community-acquired urinary tract infections in Turkey. J Antimicrob Chemother. 2005;56:914–918. doi: 10.1093/jac/dki344. [DOI] [PubMed] [Google Scholar]

16. Bouza E, San Juan R, Muñoz P, Voss A, Kluytmans J. A European perspective on nosocomial urinary tract infections I. Report on the microbiology workload, etiology, and antimicrobial susceptibility (ESGNI-003 study) Clin Microbiol Infect. 2001;7:523–531. doi: 10.1046/j.1198-743x.2001.00326.x. [DOI] [PubMed] [Google Scholar]

17. Foxman B. Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. Am J Med. 2002;113((suppl 1A)):5S–13S. doi: 10.1016/s0002-9343(02)01054-9. [DOI] [PubMed] [Google Scholar]

18. Schieve LA, Handler A, Hershow R, Persky V, Davis F. Urinary tract infection during pregnancy: its association with maternal morbidity and perinatal outcome. Am J Public Health. 1994;84:405–410. doi: 10.2105/ajph 84.3.405. [DOI] [PMC free article] [PubMed] [Google Scholar]

19. Mazor-Dray E, Levy A, Schlaeffer F, Sheiner E. Maternal urinary tract infection: is it independently associated with adverse pregnancy outcome? J Matern Fetal Neonatal Med. 2009;22:124–128. doi: 10.1080/14767050802488246. [DOI] [PubMed] [Google Scholar]

20. Hsu C, Witter F. Urogenital infection in preeclampsia. Int J Gynecol Obstet. 1995;49:271–275. doi: 10.1016/0020-7292(95)02373-k. [DOI] [PubMed] [Google Scholar]