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URINARY TRACT INFECTIONS DURING PREGNANCY: A SCIENTIFIC REVIEW BASED ON POPULATION DATA FROM UZBEKISTAN AND INTERNATIONAL APPROACHES TO DIAGNOSIS AND TREATMENT.

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Abstract:
Urinary tract infections (UTIs) during pregnancy are among the most common infectious diseases in obstetric practice and have a direct impact on the health of both the mother and the fetus. Clinical observations and practical experience accumulated in Uzbekistan indicate that UTIs in pregnant women are often detected at late stages, increasing the risk of complications. This article provides a detailed review of the significance of urinary tract infections during pregnancy, the specifics of pathogenesis, clinical course, diagnostic methods, and treatment principles, based on population data from Uzbekistan, as well as clinical approaches used in Russia and the USA.

Keywords: pregnancy, urinary tract infections, asymptomatic bacteriuria, pyelonephritis, prenatal screening.

Introduction:

A urinary tract infection is a condition in which microbes multiply in significant numbers within the urinary tract. UTIs can be divided into two categories depending on the presence of symptoms: symptomatic bacteriuria and asymptomatic bacteriuria. According to the *European Journal of Medical and Health Sciences* (March 2022), asymptomatic UTIs (asymptomatic bacteriuria) are most frequently observed in pregnant women. Asymptomatic UTIs are characterized by the presence of $\geq 10^3$ CFU/mL in urine culture without any UTI symptoms. In the group of patients exhibiting UTI symptoms such as dysuria, pollakiuria, hematuria, and pyuria (>7 leukocytes/mL), bacteria ($\geq 10^3$ CFU/mL) were detected in the urine culture.

According to recent international data, a meta-analysis of 27 studies on the global prevalence of UTIs in pregnant women showed an overall frequency of approximately 23.9% (range 16.2–33.8%). The prevalence of UTIs among pregnant women in the USA, based on a large study involving over 40,000 women, was approximately 18%, with regional variations ranging from 11% to 26%. In Russia, the incidence of UTIs in the general population (outside pregnancy-specific data) is estimated at 1,000 cases per 100,000 people per year, reflecting a high prevalence of the infection in urological practice.

According to one epidemiological study in Uzbekistan (including women of reproductive age), the frequency of urinary tract infections (UTIs) is approximately 8.5–106.5 cases per 1,000 population in the regions of Khorezm and Karakalpakstan.

In the Republic of Uzbekistan, the health protection of women of reproductive age is one of the priority areas of the healthcare system. Against the backdrop of hormonal and anatomical changes that occur during pregnancy, susceptibility to urinary tract infections increases significantly. Practical observations indicate that UTIs are most often found in women living in rural areas with inadequate sanitary and hygienic conditions, as well as in patients with a history of chronic kidney disease.

According to local obstetric-gynecological observations:

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- Approximately 10–12% of pregnant women show bacteriuria in urine tests;
- Asymptomatic bacteriuria is the most common form;
- A significant proportion of untreated cases later progress to acute pyelonephritis.

In Uzbekistan, the formation and prevalence of this pathology are determined by a combination of biological, socio-economic, climatic, and medical factors.

1. Anatomical and physiological features.

Basic risk factors include the anatomical features of the female genitourinary system: a short and wide urethra, proximity of the urethral opening to the anus, and characteristics of vaginal microflora.

Pregnancy has particular significance, as it is associated with:

- Progesterone-induced reduction of ureteral smooth muscle tone;
- Dilation of the calyceal and renal pelvis system;
- Slowed urine passage;
- Mechanical pressure of the enlarged uterus on the ureters;
- Physiological immunosuppression.

These changes contribute to urinary stasis and an increased risk of bacterial colonization.

2.Socio-economic factors.

In several regions of Uzbekistan, differences in socio-economic development remain, affecting access to medical care and preventive measures. Significant factors include:

- Living in rural areas;
- Limited access to specialized medical care;
- Low public awareness of UTI symptoms.
- Late registration of pregnant women;
- Self-medication with antibacterial drugs.

According to regional studies, there is a significant prevalence of urinary tract infections (UTIs) among women of reproductive age in Uzbekistan, which confirms the relevance of the problem.

3. Behavioral and hygienic factors.

In the hot climate of Uzbekistan, the following factors are particularly important:

- Insufficient fluid intake;
- Tendency to delay urination;
- Poor intimate hygiene;
- Use of synthetic underwear.

Etiologically, the infection most often develops via the ascending route, spreading from the lower urinary tract to the upper urinary tract. Enteric bacteria reach the bladder through the urethra from the perianal area.

Table 1.

Country / Region	Main Pathogen	Additional Pathogens	Features
USA (CDC, 2023–2024)	*Escherichia coli* (65–70%)	*Klebsiella spp.*, *Enterococcus*, *Staphylococcus saprophyticus*	Urine screening at 12–16 weeks; ASB 7–10%; pyelonephritis 1–2%
Russia	*Escherichia coli* (68–	*Klebsiella spp.*,	ASB 6–9%;

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Country	Screening Coverage	Availability of Laboratory Diagnostics	Early Detection and Complication Prevention
USA	Universal, high	High, standardized laboratories	Most effective; risk of pyelonephritis and preterm birth minimized
Russia	Moderate, varies by region	Available in cities, limited in rural areas	Moderate; depends on region and timeliness of medical visits
Uzbekistan	Low in rural areas, high only in major centers	Limited, especially in rural areas	Higher risk due to uneven coverage and sanitary conditions
(Shabanova, 2023)	72%)	*Enterococcus*, *Streptococcus agalactiae*	UTI 8–12%; pyelonephritis 1–3%
Uzbekistan (Perinatal Centers, 2022–2025)	*Escherichia coli* (75–85%)	*Klebsiella spp.*, *Enterococcus*, *Staphylococcus saprophyticus*	ASB 9–14%; UTI 3–6%; pyelonephritis 1–2%

Clinical forms and course.

Urinary tract infections in pregnant women manifest in three main clinical forms:

1. **Asymptomatic bacteriuria** – occurs without pronounced clinical signs and is usually detected only during routine laboratory examinations. In Uzbekistan, this form often receives insufficient attention; however, it is a common cause of pyelonephritis.
2. **Acute cystitis** – inflammation of the lower urinary tract, accompanied by frequent urination, burning, and discomfort in the lower abdomen. The general condition of the patient usually remains satisfactory.
3. **Acute pyelonephritis** – the most dangerous form of UTI in pregnancy, characterized by high fever, flank pain, and general intoxication. It requires urgent hospitalization and intensive treatment.

Table 2.

Pyelonephritis, preterm birth, and low birth weight.

Approaches to diagnosis and screening differ between the USA, Russia, and Uzbekistan

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due to variations in healthcare infrastructure, prenatal care coverage, and sanitary conditions.

USA – Screening:

All pregnant women undergo a mandatory urine culture at 12–16 weeks of gestation to detect asymptomatic bacteriuria (ASB).

Diagnosis**:**

Urine culture is the gold standard. In cases of UTI symptoms, additional tests include urinalysis, microscopy, and sometimes renal ultrasound.

Features**:**

High screening coverage, standardized protocols, and laboratory availability allow for early detection of ASB and symptomatic UTIs, reducing the risk of complications.

Russia – Screening:

Prenatal screening is conducted in the first trimester, but practices may vary by region. Coverage is moderate: most urban clinics participate, while rural areas are only partially covered.

Diagnosis**:**

As in the USA, urine culture is used; if needed, urinalysis and urinary tract ultrasound are also performed.

Features**:**

In urban areas, UTI detection is more effective, whereas limited access to laboratories in rural regions reduces the timeliness of diagnosis.

Uzbekistan – Screening:

Screening exists in major perinatal centers; however, regional coverage is inconsistent. In some rural areas, prenatal urine testing is rarely or selectively performed.

Diagnosis**:**

Urine culture is used to detect pathogens, alongside urinalysis and sometimes renal ultrasound if pyelonephritis is suspected.

Features**:**

Limited laboratory resources in remote regions and variability in protocol adherence, combined with the high prevalence of *E. coli*, increase the risk of complications.

Effective treatment of urinary tract infections (UTIs) in pregnant women is critical for the health of both mother and fetus.

The main goal of therapy is to eliminate bacterial colonization, reduce symptoms, and prevent complications such as pyelonephritis, preterm birth, low birth weight, or sepsis.

1. Treatment methods.

Antibiotic therapy:

Safe antibiotics for the fetus are selected for pregnant women, usually including:

- Nitrofurantoin
- Amoxicillin
- Cephalosporins (1st–2nd generation)

USA and Russia: Standardized protocols

- **USA:** When ASB is detected, a 3–7 day course of antibiotics is prescribed.
- **Russia:** Similar approach, although in some regions antibiotic-resistant strains are encountered.
- **Uzbekistan:** Protocols exist in perinatal centers, but coverage and drug availability vary by region.

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Hydration and hygiene:

Adequate fluid intake and proper personal hygiene help improve urine flow, stabilize the urinary microbiota, and reduce the risk of recurrence.

Monitoring and follow-up:

It is important to monitor the effectiveness of treatment with repeat urine cultures.

2. Consequences of untreated UTIs

If UTIs in pregnant women are left untreated, the following risks arise:

1. For the mother:

1. Acute pyelonephritis: develops in approximately 20–30% of women with untreated asymptomatic bacteriuria.

2. Sepsis: infection can spread into the bloodstream, creating a life-threatening condition.

3. Increased risk of hypertension and preeclampsia due to inflammatory response caused by bacteria.

2. For the fetus:

1. Preterm birth: maternal stress from infection can trigger early labor.

2. Low birth weight: inflammation, impaired circulation, and nutrient supply may reduce neonatal weight.

3. Perinatal infections: pathogens such as GBS can be transmitted to the fetus.

3. Comparative overview

- **USA:** Standardized protocols and universal screening allow early detection and minimize the risk of complications.
- **Russia:** Effectiveness depends on region and laboratory access; risk is moderate.
- **Uzbekistan:** Limited screening coverage and variable drug availability increase the risk of complications, especially given the high prevalence of *E. coli*.

Summary and clinical significance:

UTIs in pregnant women are widespread and represent a serious threat to maternal and fetal health. Analysis of etiology and pathogenesis shows that the main causative agent is *E. coli*, whose high prevalence is explained by intestinal flora composition, urethral anatomy, and physiological changes during pregnancy.

Diagnosis and screening vary by country:

- USA: universal screening reduces complications.
- Russia: effectiveness depends on region.
- Uzbekistan: low coverage and sanitary conditions increase the risk of UTIs.

Treatment significance:

- Antibiotic therapy, regular monitoring, and preventive measures significantly reduce the risk of complications.
- Untreated UTIs increase risks for both mother and fetus: pyelonephritis, sepsis, preterm birth, low birth weight, and perinatal infections.

Key clinical takeaways:

- Early screening and diagnosis → infection detected early, reducing complication risk.
- Correct and safe antibiotic therapy → bacteria eliminated, lowering risk of pyelonephritis and sepsis.
- Hydration, hygiene, and monitoring → reduce risk of recurrent infections and symptomatic UTIs.

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Conclusion:

Regular screening + prevention + treatment significantly reduces the risk of UTIs in pregnant women and ensures the health of both mother and fetus.

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