

## Asymptomatic Bacteriuria-Effect of Screening and Treatment on Fetal Outcome

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### Abstract

**Background:** Urinary tract infection (UTI) is the most common urologic concern in pregnancy and is categorised as complicated UTI as there is more risk of persistence, recurrence following treatment and progression to acute pyelonephritis.**Aim:** To determine the association between urinary tract infection and pregnancy outcome.**Materials and Methods:** A Prospective randomised Study. Materials and Methods: 12 months (August 2021-August 2022) The study was done from June 2020 to June 2023 among the expectant women attending Government Medical College, Ananthapuramu hospital prenatal clinic. The study's subjects were antenatal women irrespective of parity & age who attended the hospital for the first time in their antenatal period between 12-16 weeks of gestational age.**Results:** At 12 to 16 weeks of gestation, 200 of the 250 prenatal patients in the outpatient clinic at the Government medical college Hospital, Ananthapuramu were screened. The remaining 50 were taken for statistical analysis. Asymptomatic bacteriuria was present in 9.5% of this population.**Keywords:** Gestation, Bacteriuria, Ananthapuramu, Fetal, outcome.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

### Introduction

Urinary tract infection (UTI) is the most common urologic concern in pregnancy and is categorised as complicated UTI as there is more risk of persistence, recurrence following treatment and progression to acute pyelonephritis. Increased incidence of UTI in pregnancy is favoured by increased intravesical pressure, vesicoureteric reflux, potential for urinary retention, physiological hydronephrosis and immunosuppressed state of pregnancy.

#### The following categories apply to UTIs:

When there are more than 10<sup>5</sup> colonies per millilitre of urine but no signs of an acute urinary tract infection, the condition is known as asymptomatic bacteriuria. [1,2,3]

#### UTI can be classified as:

When there are more than 10<sup>5</sup> colonies per millilitre of urine but no signs of an acute urinary tract infection, the condition is known as Asymptomatic bacteriuria (ASB). [1,2,3] Depending on which portion of the urinary system is impacted, there are lower tract infections and upper tract infections. [4]

Upper urinary tract infection: Pyelonephritis, an inflammation of the renal parenchyma, calices, and pelvis, is the infection's primary location in the kidney. [5] Lower urinary tract infection: The urethra (urethritis) or bladder (cystitis) may be the site of the infection. [4]

**Uncomplicated UTIs:** Infections that affect the normal function of the voiding mechanism or flow of urine without there being any anatomical or functional abnormalities of the urinary tract [4]

**Complicated Urinary Tract Infections:** Infection that develops in people with urinary system anomalies that obstruct urine's natural flow and the urinary tract's defence mechanisms. Congenital abnormalities, renal calculi, catheterization, or tract blockage are likely causes of such complex UTIs. [6]

Pregnancy-related urinary tract infection (UTI) is described as a complex UTI women who are not pregnant.

However, the natural course of asymptomatic UTIs in pregnancy is very different. Although asymptomatic bacteriuria is often benign in the non-pregnant state, up to 40% of affected gravidas proceed to overt cystitis or pyelonephritis.

Therefore, treating pregnant women with positive urine cultures and screening all pregnant women for the presence of asymptomatic bacteriuria will avoid the majority of symptomatic urinary tract infections, including pyelonephritis, and reduce premature and low birth weight New-borns. In the prenatal period, acute pyelonephritis can cause anaemia (23%), sepsis (17%), transitory renal failure (2%), and pulmonary insufficiency (7%) in addition to other conditions. About one-fifth of pregnant women get sepsis and multi-organ failure caused by endotoxins. 1 in 50 women with pyelonephritis develop ARDS. [7]

#### **AIM:**

To determine the association between urinary tract infection and pregnancy outcome.

#### **Material and Method:**

The study was done from June 2020 to June 2023 among the expectant women attending Government Medical College, Ananthapuramu hospital prenatal clinic. The study's subjects were antenatal women irrespective of parity & age who attended the hospital for the first time in their antenatal period between 12-16 weeks of gestational age.

In addition to the standard tests performed during the initial visit, a midstream clean catch early morning sample was taken from each one.

They were told how to lower the likelihood of contamination. The sample was taken in sterile containers, and it was processed either right away or in two hours after it was taken.

Three different tests used the sample, each of which was taken individually. Each patient's urine sample was checked by dipstick for the presence of nitrite; one portion was sent for a regular urine analysis, while the other half was sent for a culture, sensitivity test, and colony count.

#### **Urine Culture & Sensitivity**

- The urine sample was cultured on a Mac Conkey agar, blood agar, and Sabouraud dextrose agar plate.
- Both the undiluted and diluted samples were coated to the culture medium at a dilution rate of 1/10th.

- The amount of sample used was about 0.01 ml.
- To find facultative and strict anaerobes, one set of the inoculation plates was incubated aerobically, and the other set was incubated anaerobically.
- Aerobic cultures were incubated for 24 hours at 37°C, and anaerobic plates were incubated for 72 hours.
- The aerobic plates that displayed no growth were given a second 24-hour incubation, after which the final report was obtained.
- Samples with 10<sup>5</sup> or more germs per millilitre were regarded to have significant bacteriuria.
- The bacterial colonies in the culture media were identified using Cowan and Steel's protocols. To obtain significant bacteriuria, the CFU/ml was compared to the quantity of pus cells in the wet preparation.
- If 10<sup>5</sup> CFU/ml were collected in culture and more than 3-5 pus cells/HPF were visible under the microscope, growth is considered substantial.
- By using the multidisc Oxoid disc diffusion approach, sensitivity was attained.

The Kirby-Bauer approach was used to interpret the Zone-size interpretation chart.

#### **Inclusion Criteria:**

1. Pregnant women between 12-16 weeks of gestation attending the antenatal OPD irrespective of parity.
2. Pregnant women with no signs & symptoms of UTI.
3. Patients planning to get delivered at our hospital.

#### **Exclusion Criteria:**

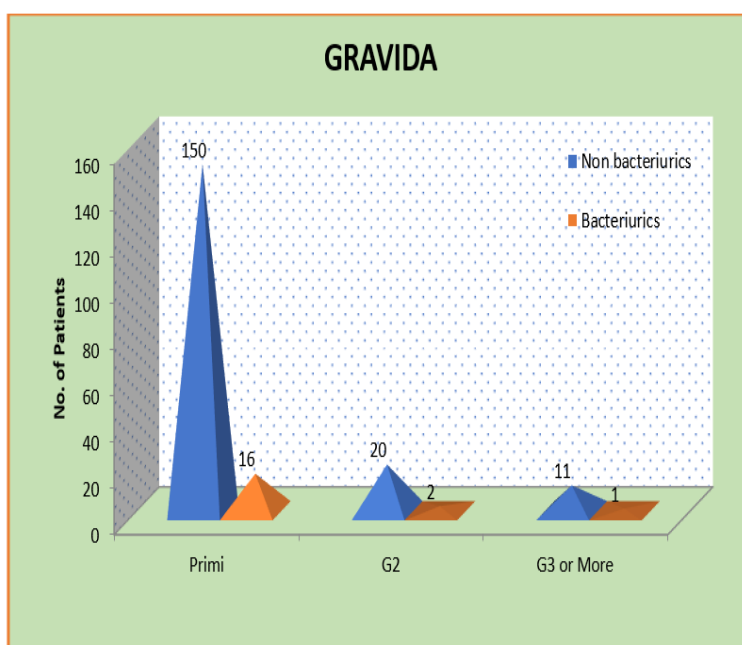
1. Pregnant women taking antibiotics.
2. Known case of renal disease and patients with renal anomalies.
3. Symptoms suggestive of UTI.
4. Pregnant women with anemia & HTN in their first antenatal visit.

#### **Results**

The study group's 14.9% incidence of ASB was attributable to the women's lower socioeconomic position. At the first antenatal visit, screening revealed that 19 pregnant women had bacterial cultures that were positive.

**Table 1: Distribution in different gravida**

Obstetric code	UC					
	Non bacteriurics		Bacteriurics		Total	
	No. of Patients	%	No. of Patients	%	No. of Patients	%
Primi	150	82.9	16	84.2	166	83.0
G2	20	11.0	2	10.5	22	11.0
G3 or More	11	6.1	1	5.3	12	6.0
Total	181	100.0	19	100.0	200	100.0
Chi-square	$\chi^2 = 0.027^{\circ}$ ; (p = 0.987); df= 2; Not significant;					



**Graph 1: Primigravidas comprised 82.9% of the bacteriurics. This suggests that these women may have had bacteriuria even before getting married, which has been revealed by alterations to the urinary system that occur during pregnancy**

**Table 2: Urine analysis:**

Urine protein	UC						Chi-square
	Non bacteriurics		Bacteriurics		Total		
	No. of patients	%	No. of patients	%	No. of patients	%	
Negative	174	96.1	12	63.2	186	93.0	$\chi^2 = 67.151^{**}$ ; (p = 0.000); df= 1; Highly significant;
Positive	7	3.9	7	36.8	14	7.0	
Total	181	100.0	19	100.0	200	100.0	
<b>Urine Pus Cell</b>							
Negative	171	94.5	17	89.5	188	94.0	$\chi^2 = 0.171^{\circ}$ ; (p = 0.382); df= 1; Not significant;
Positive	10	5.5	2	10.5	12	6.0	
Total	181	100.0	19	100.0	200	100.0	

**Table 3: Causative organisms**

Urine protein	UC						Chi-square
	Non bacteriurics		Bacteriurics		Total		
	No. of patients	%	No. of patients	%	No. of patients	%	
Negative	174	96.1	12	63.2	186	93.0	$\chi^2 = 67.151^{**}$ ; (p = 0.000); df= 1; Highly significant;
Positive	7	3.9	7	36.8	14	7.0	
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Positive	10	5.5	2	10.5	12	6.0	
Total	181	100.0	19	100.0	200	100.0	

5.3% of the bacteriurics belonged to socioeconomic class V, a significant connection that has been documented in the literature. Single 52.6% of bacteriurics were positive for nitrite, indicating that the test is not sensitive enough to be utilised as the only screening method.

E. coli was the most common causative organism as in various studies worldwide.

**Table 4: Fetal outcome  
CAUSATIVE ORGANISMS**

UC	No. of Patients	%
Nil	181	90.5
E.Coli	12	6.0
Klebsiella	7	3.5
Total	200	100.0

The occurrence of low birth weight infants and preterm delivery was reduced similar to that in non bacteriurics suggesting the importance of screening and treatment of ASB during pregnancy.

**Table-5: Low birth weight**

Fetal Outcome	UC					
	Non bacteriurics		Bacteriurics		Total	
	No. of Patients	%	No. of Patients	%	No. of Patients	%
Abortion	1	6	2	10.5	3	1.5
Preterm	5	2.8	6	31.6	11	5.5
Term	175	96.7	11	57.9	186	93.0
Total	181	100.0	19	100.0	200	100.0
Chi square	$\chi^2 = 40.147^{**}$ ; (p = 0.000); df= 2; Highly significant;					

Birth Weight	UA1					
	Non bacteriurics		Bacteriurics		Total	
	No. of Patients	%	No. of Patients	%	No. of Patients	%
1.00 to 1.50 Kgs	2	1.1	2	11.8	4	2.0
1.60 to 2.40 Kgs	5	2.8	3	17.6	8	4.1
2.50 to 2.90 Kgs	131	72.8	7	41.2	138	70.1
3 Kgs & Above	42	23.3	5	29.4	47	23.9
Total	180	100.0	17	100.0	197	100.0
Chi-square	$\chi^2 = 19.595^{**}$ ; (p = 0.000); df= 3; Highly Significant;					

## Discussion

At 12 to 16 weeks of gestation, 200 of the 250 prenatal patients in the outpatient clinic at the Government medical college Hospital, Anantapuramu were screened. The remaining 50 were taken for statistical analysis. Asymptomatic bacteriuria was present in 9.5% of this population.

**INCIDENCE:** Because different demographic factors affect people from different places, incidence differs between them. Williams claims that the incidence ranges from 2 to 7%. According to Ian Donald, the incidence varies from 2.5 to 11%. The incidence in this study is 9.5%, which may be related to low socioeconomic position.

The risk of developing symptomatic UTI and acute pyelonephritis in pregnant women with ASB is well established. Hill et al [8] reported an incidence of 1.4 per cent of acute pyelonephritis in pregnancy. This is less than the reported rate of 3-4 per cent in the early 1970s before screening for asymptomatic bacteriuria became a routine. Smaill et al in a systematic review showed the overall incidence of pyelonephritis in the untreated ASB group to be 21 per cent with a range of 2.5 to 36 per cent [9]. Treatment of ASB led to approximately a 75 per cent reduction in the incidence of pyelonephritis [14]. Successful treatment also reduces the rate of subsequent symptomatic UTI by 80-90 per cent [10].

**ASB and Premature Delivery and Low Birth Weight Infants:** The relationship of ASB with other maternal and foetal complications remains an area of continued debate. The incidence of anaemia was found to be high in all the groups despite treatment. The strength of association between ASB and anaemia could not be established due to the multipronged aetiopathogenesis of anaemia during pregnancy [11].

The frequency of premature delivery, low birth weight, and its related perinatal mortality are reduced when ASB is treated during pregnancy at the first prenatal visit in the early stages of gestation. In this study, the incidence of preterm delivery was 2.8% in non-bacteriurics and 31.6% in bacteriurics who had received antibiotic treatment. P value is greater than 0.05, indicating that there is no statistically significant difference. Treatment of ASB at the initial prenatal appointment in the early gestation lowers the likelihood of preterm birth, low birth weight, and the perinatal death it causes.

Antibiotic-treated bacteriurics experience a low birth weight incidence of 17.6%, compared to 3.9% in non-bacteriurics. The difference is not statistically significant because the p value is higher than 0.5. In the non-bacteriuric group, there were two neonatal fatalities with birth weights of 1 to 1.5 kg. In the bacteriuric group, infant mortality was nonexistent. This study's findings are consistent with earlier ones

in that treating asymptomatic bacteriuria during pregnancy with antibiotics significantly lowers the risk of preterm birth and low birth weight babies, compared to non-bacteriurics.

Adam et al [12] suggested that screening and treatment of asymptomatic bacteriuria during antenatal care will be one of the most cost-effective interventions at the primary care level for mothers and newborns in developing countries to achieve the millennium development goals for health.

ASB was found in 17 per cent pregnant women till 20 wk and in 16 per cent between 32 to 34 wk gestation. Increased incidence of preeclamptic toxemia (PET) [RR 3.79, 95% CI 1.80-7.97], preterm premature rupture of membrane (PPROM) [RR 3.63, 45% CI 1.63-8.07], preterm labour (PTL) [RR 3.27, 95% CI 1.38-7.72], intrauterine growth restriction (IUGR) [RR 3.79, 95% CI 1.80-7.97], low birth weight (LBW) [RR 1.37, 95% CI 0.71-2.61] was seen in late detected women (32-34 wk) as compared to ASB negative women, whereas no significant difference was seen in early detected women (till 20 wk) as compared to ASB negative women [13].

## Summary and Conclusion:

The study excluded 15 patients who had IUD, multiple pregnancies, placenta praevia, or a congenital foetal abnormality. 35 women disappeared during the follow-up. For the statistical study, 200 women were considered. The negative consequences of bacteriuria in the mother and newborn were observed in both bacteriurics and non-bacteriurics up until delivery were observed & analysed.

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