

## White Blood Cell Cast in Urine in Acute Pyelonephritis in Pregnant Women

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### Abstract

In the present study of outpatient settings, pyelonephritis was diagnosed in pregnant women by the history and physical examination & supported by urinalysis result. After a clino-pathological confirmation of pyelonephritis, 50 pregnant women were selected. The urine sample was subjected for routine examination & urine sediment was examined for the evidence of pyelonephritis & particularly attention was given to the presence of white blood cell cast. A total of 13% of these patients had WBC cast in urine. Acute pyelonephritis is a bacterial infection of the kidneys that affects 1 to 2 per cent of pregnant women. In most cases, the infection first develops in the lower urinary tract. If it's not diagnosed and treated properly, the infection may spread from your urethra and genital area to bladder and then to one or both of kidneys.

**Keywords:** Urine; Pyelonephritis; White Blood Cell Cast.

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### Introduction

UTIs and Acute pyelonephritis are among the most common bacterial infections during pregnancy & causes various changes woman's body. This is due to physiological changes during pregnancy that can interfere with the flow of urine.

Normally, the ureters drain urine from the kidney into the bladder and out of the body through the urethra. These changes are further enhanced by short urethra which is approximately 3-4 cm in females, and difficulty with hygiene due to a distended pregnant belly, increase the frequency of urinary tract infections (UTIs) in pregnant women. During pregnancy, the high concentration of the hormone progesterone can inhibit contraction of these drainage ducts. Also, as the uterus becomes enlarged during pregnancy.

Acute pyelonephritis is one of the most common indications for ante-partum hospitalization, estimated at approximately 15% of all indications for pre-delivery hospitalization.

### Diagnosis of Pyelonephritis

History and physical examination are the most useful tools for diagnosis. Characteristically patients have high fever, although it may be absent early in the illness. Flank or back pain may be accompanied by systemic symptoms (e.g. fever, chills, abdominal pain, nausea and vomiting). Clinical signs of fever, costo-vertebral angle tenderness (CVAT) with or without leukocytosis are typically present is nearly universal, and its absence should raise suspicion of an alternative diagnosis. The clinical index for suspicion of acute pyelonephritis in pregnant patients should be high.

### Laboratory Diagnosis of Pyelonephritis

Urinalysis and urine culture are the initial tests to perform in women who present with clinical signs and symptoms of UTI & acute pyelonephritis. Most women with acute pyelonephritis have marked pyuria a positive nitrite test & or a positive leukocyte esterase test, with sensitivity and specificity for the combination of 92% and 95%, respectively. It is often accompanied by microscopic hematuria or a positive heme dipstick test. In contrast, gross hematuria is rare in patients with acute pyelonephritis and is more common in patients with acute uncomplicated cystitis. The presence of white blood cell casts indicates renal-origin pyuria, supporting the diagnosis of acute pyelonephritis.

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(Received on 29.08.2017, Accepted on 14.09.2017)

*WBC Cast:* White blood cells (generally neutrophils) are present within or upon casts. These casts are typical for acute pyelonephritis, but they may also be present with glomerulonephritis. They may also be seen in acute interstitial nephritis, lupus nephritis, and acute papillary necrosis.

Examination of the peripheral blood smears showing leucocytosis with or without left shift.

#### **Analytic Parameters**

- The following pre analytical parameters were taken into account
- Adherence to laboratory protocol using the same
- Supplies
- Sequences of procedural steps
- Timing intervals
- Equipment's
- Ensures accuracy & precision of microscopic analysis of urine sediment.

#### **Materials & Methods**

The study was carried out during April 2016 - May 2017, in R.D. Gardi Medical College, Ujjain in department of Pathology. 50 pregnant women suffering from clinical pyelonephritis were subjected for routine urine analysis for the presence of White blood cell cast.

##### *Collection of Urine Sample*

Clear verbal instructions were given to the entire patient's regarding collection of urine. Fresh clean catch mid-stream sample, collected in sterile urine container without any preservatives in the laboratory itself.

##### *Exclusion Criteria for Rejection of Sample*

Samples brought from home were not included in the study.

##### *Time to Process the Sample*

In all cases it was done within 1 hour after collection.

##### *Specimen Preparation*

12ml of freshly voided well mixed urine sample was centrifuged in a 15 ml glass conical tube at 450rpm for

5 minutes. 11 ml of urine was transferred to another tube for routine chemical test by DIPSTICK method. 1 ml of remaining urine was re-suspended in the same tube (12:1 concentration).

The sediment was mixed by and then examined under the microscope, using a cover slip.

##### *Slide Preparation*

Slide was labelled on the frosted end with patient's name, date & accession number. Two drops of concentrated urine was mixed by "finger-flicking" method & placed on the slide & spread slightly.

##### *Examination of the Slide and Urinary Cast Enumeration*

Slide was first scan along the edges of the cover slip under 100 X & then under high power (400 X) for minute details. Examination was done under subdued light. Other microscopic abnormalities were also taken into account. The cast were reported as 0- 2, 3-5 per low power field by scanning 10 microscopic field.

##### *Appearance of WBC Cast*

White blood cells (generally neutrophils) are present within or upon casts. These casts are typical for acute pyelonephritis, but they may also be present with glomerulonephritis.

#### **Observation & Result**

A total of 50 patients were included in the present study & were coded as acute pyelonephritis. Out of the 50 patient's 12% (6 cases) had positive test for white blood cell cast. On urine analysis 100% cases had pyuria, 40% were dipstick leukocyte esterase test (LET) positive, and 43% had microscopic hematuria. LET results have sensitivity of 75% for detecting more than 10 WBC /hpf.

#### **Discussions**

Urinalysis and urine culture are the initial tests to perform in women who present with clinical signs and symptoms of UTI & acute pyelonephritis. Most women with acute pyelonephritis have marked pyuria a positive nitrite test & or a positive leukocyte esterase test, with sensitivity and specificity for the combination of 92% and 95%, respectively. It is often accompanied by microscopic hematuria or a positive heme dipstick test. In contrast, gross hematuria is rare in patients

with acute pyelonephritis and is more common in patients with acute uncomplicated cystitis. The presence of white blood cell casts indicates renal-origin pyuria, supporting the diagnosis of acute pyelonephritis. The diagnosis is ultimately confirmed by a positive urine culture. In our study the WBC cast were 12%. Pyuria is defined as the presence of more than 5 cells per hpf on microscopic examination of the urinary sediment.

#### Other Causes of WBC Cast in Urine

- Glomerulonephritis
- Acute interstitial nephritis,
- Lupus nephritis, and
- Acute papillary necrosis

#### Conclusions

Acute pyelonephritis in pregnancy complicates up to 2% of all pregnancies and has been associated with significant maternal and fetal morbidity and mortality occurring in 3<sup>rd</sup> trimester. Pre-term delivery, low birth weight, maternal sepsis, renal failure and respiratory distress are among the complications associated with acute pyelonephritis and maternal-fetal compromise. Up to 20% of pregnant women develop evidence of multiorgan failure. Hypovolemia from sepsis, nausea & vomiting leads to hypotension. DIC, haemolytic anemia are complications of sepsis & endotoxemia

#### Laboratory Abnormalities

Pyuria and bacteriuria; white blood cell casts are highly predictive of acute pyelonephritis. The

diagnosis is ultimately confirmed by a positive urine culture.

#### Acknowledgement

The author is grateful to Medical Director Dr V.K. Mahadik for his advice & encouragement.

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