

# EVALUATING THE MICROSCOPIC PYURIA FOR SCREENING COVERT BACTERIURIA DURING PREGNANCY

Aziz Marjan Khattak<sup>1</sup>, Imdad Hussain<sup>2</sup>, Habib-ullah Khan<sup>3</sup> and Dur Muhammad<sup>4</sup>

<sup>1</sup>Department of Pathology & <sup>3</sup>Department of Medicine, Gomal Medical College, D.I. Khan.

<sup>2</sup>Department of Pathology, Dow Medical College, Karachi.

<sup>4</sup>Department of Pathology, Sindh Medical College, Karachi.

## ABSTRACT

**Background:** Asymptomatic bacteriuria during pregnancy is an established risk factor for mother and baby. Symptomatic urinary tract infections and its sequelae may develop during later pregnancy and even at puerperium. Abortion, prematurity, low-birth weight babies and other complications have been attributed to untreated asymptomatic bacteriuria during pregnancy. There is general agreement that screening and treatment will greatly reduce these risks.

This study was designed to evaluate the microscopic examination of urine for pyuria against the culture in asymptomatic pregnant women.

**Methods:** This study was conducted in Microbiology Department of Basic Medical Science Institute, Jinnah Postgraduate Medical Center, Karachi, during September 2001 to February 2002. Mid Stream Urine was collected from apparently normal pregnant women and the specimens were processed with out delay by microscopy and culture.

**Results:** There were 23 out of 286 cases with significant pyuria and 18 cases with significant bacteriuria. The average of ages of women screened, was  $25.33 \pm 5.81$  years. There were 10 cases showing pyuria along with bacteriuria. The sensitivity of microscopy for pyuria with relation to culture was 66.67 % and specificity was 95.37%.

**Conclusion:** Pyuria by microscopic examination cannot be used as a screening procedure for covert bacteriuria due to low values of sensitivity. Culture remains the standard method for screening covert bacteriuria during pregnancy.

**Key words:** Pregnancy, Pyuria, Bacteriuria, Microscopy and Culture.

## INTRODUCTION

Asymptomatic bacteriuria is called covert bacteriuria when detected by screening programme.<sup>1</sup> Covert bacteriuria is present during early period of gestation. It may develop symptomatic urinary tract infections and complications for both mother and baby.<sup>2,6</sup>

Screening and treatment at early stage substantially reduces the untoward complications<sup>6,9</sup>. Covert bacteriuria can be detected by different methods<sup>10</sup>. Screening for covert bacteriuria has been recommended on 1st obstetric visit to antenatal unit or at 12 to 16 weeks of gestation<sup>6,10,11</sup> or even later in pregnancy<sup>12</sup>. Culture is the gold standard method for detection of bacteriuria<sup>10,12</sup> but very expensive one and cannot be applied everywhere<sup>10</sup>.

This study was conducted to evaluate the less expensive method of urine examination by microscopy for significant pyuria to compare with culture results. This method is also commonly available as compared to culture. Apparently normal pregnant women are to screen for covert bacteriuria. The high-risk pregnant women (with known congenital urinary tract abnormali-

ties, diabetes mellitus, recurrent urinary tract infections) are more vulnerable to have infection<sup>13</sup>.

## MATERIAL AND METHODS

This study was conducted in Microbiology Department of Basic Medical Sciences Institute, Jinnah Postgraduate Medical Center, Karachi, during September 2001 to February 2002. Mid Stream Urine of at least 4 hours stay in bladder was collected from apparently normal 286 pregnant women and the specimens were processed without delay by microscopy and culture<sup>14,15</sup>. Women with symptomatic urinary tract infection, pyrexia, taking antibiotics within two weeks time were excluded from the study. Urine was immediately processed, in case of delay it was refrigerated at 2-4°C for not more than 2 hours.

Heamocytometer was used for white blood cells (WBCs) counting and the count  $\geq 10$ WBCs/cmm in urine was taken significant Pyuria<sup>16</sup>. Semi-quantitative aerobic culture on blood agar was done. After 24 hours incubation at 37°C the growth of  $> 10^5$ /ml was taken significant<sup>6,10,16</sup>. Later in description, by Pyuria and bacteriuria we mean significant Pyuria and significant bacteriuria respectively.

**Table: Showing number of pyuric and culture positive bacteriuric results in 286-screened cases.**

Type of test	Total cases	Positive for	Negative for	TP=10 FP=13
Significant Pyuria On microscopy	23	Culture 10	Culture 13	TN=268 FN=5
Significant bacteriuria on culture	18	Pyuria 10	Pyuria 8	Sensitivity=66.67% Specificity=95.37%

TP=true positive, FP=false positive, TN=true negative, FN=false negative.

Considering culture, the gold standard method, we applied the following statistical methods for evaluating the microscopic examination of Pyuria: sensitivity=TP/(TP+FN); specificity=TN/(TN+FP); positive predictive value=TP/(TP+FP); negative predictive value=TN/(TN+FP) and accuracy=(TP+TN)/(TP+TN+FP+FN) where TP is the number for true positive diagnosis, TN is the number for true negative diagnosis, FP is the number for false positive diagnosis, and FN is the number for false negative diagnosis<sup>17</sup>.

## RESULTS

A total 286 pregnant women were screened for bacteriuria with mean ages 25.33±5.81 years and mean ages of culture positive cases was 24.62±4.87 years. Significant Pyuria was found in 23 patients and significant covert bacteriuria was found in 18 patients as shown in Table. Among the 23 pyuric cases, 10 diagnoses were found true positive (TP) for culture and 13 were false positive (FP). Hence 268 cases were found true negative (TN) for culture but Pyuria showed 263 cases negative Thus Pyuria reported 5 cases false negative (FN). Pyuria when compared with bacteriuria on culture, microscopic Pyuria showed 66.67% sensitivity and 95.37% specificity, 43.47% positive predictive value, 98.16% negative predictive value and 93.91% accuracy.

## DISCUSSION

Our result findings are dissimilar to 83% sensitivity and 59% specificity reported by DiGessipie<sup>10</sup> done on sediment of urine but our results are in agreement with recommendations given on Pyuria as screening indicator that it is poor screening test<sup>10</sup>. Detection of Pyuria cannot be recommended on two bases: (1) Different standards for WBCs count in urine adopted as  $^38/\text{cmm}$ <sup>18</sup>, 200,000/hour<sup>19</sup>,  $>10/\mu\text{l}$  ( $9\text{WBCs}/\mu\text{l} = 1\text{WBC}/\text{High Power Field}$ ).<sup>20</sup> (2) Risks of undetected and untreated bacteriuria are more during pregnancy as compared to general population. This test method, in addition to variation in standards, requires significant time, expensive equipment, and skill on the part of operator<sup>4,11</sup>. Hence the indirect method for leukocytes estimation (leuko-

cytes esterase) was developed but that still not reliable for screening covert bacteriuria even in general population<sup>6,10,22</sup>.

## CONCLUSION

Pyuria is counted for bacteriuria as an indicator of infection but significant Pyuria may be present without significant bacteriuria or significant bacteriuria may be present with Pyuria or without Pyuria. Pyuria having low sensitivity for bacteriuria culture positive cases and low specificity for culture negative cases cannot be used for screening covert bacteriuria during pregnancy. Hence urine culture remains the standard method for screening covert bacteriuria during pregnancy.

## REFERENCES

1. Sava DCL, Wilson MI, McHardy M, Deward DAE, Fee WM. Covert bacteriuria of childhood – A clinical and epidemiological study. *Arch Dis Childhood* 1973; 48: 8-20.
2. Schieve LA, Handler A, Hershov R, Persky V and Davis F. Urinary tract infection during pregnancy: Its association with maternal morbidity and perinatal outcome. *Am J Public Health* 1994; 84(3): 405-410.
3. Naeye RL. Causes of the excessive rates of perinatal mortality and prematurity in pregnancies complicated by maternal urinary tract infections. *N Eng J Med* 1979; 300(15):819-823.
4. Towers CV, Kaminskas CM, Garite TJ, Nageotte MP and Dorchester W. Pulmonary injury associated with antepartum pyelonephritis: Can patients at risk be identified? *Am J Obstet Gynecol* 1991; 164(4): 974-980.
5. Gold EM, Traub FB, Daichman I and Terris M. Asymptomatic bacteriuria during pregnancy. *Obstetrics and Gynecology* 1966; 27(2):206-209.
6. Delzell JE and Lefevre ML. Urinary tract infections during pregnancy. *Am Fam Physician* 2000; 61:713-721.
7. Andriole VT. Urinary tract infections in pregnancy. *Symposium on Urol Clin North Am* 1975; 2(3): 485-499.

8. Harris RE. The significance of eradication of bacteriuria during pregnancy. *Gynecol* 1979; 53(1): 71-73.
9. Kass EH. Pyelonephritis and bacteriuria. A major problem in preventive medicine. *Ann Intern Med* 1962; 56(1): 46-53.
10. Patterson TF, Andriole VT. Detection, significance, and therapy of bacteriuria in pregnancy. Update in the managed health care era. *Infect Dis Clin N Am*; 1997; 11(3): 593-608.
11. DiGiuseppi C. Screening for Asymptomatic Bacteriuria In: *Guide to Clinical Preventive Services*. US Preventive Services Task Force. Department of Health and Human Services, 1996.
12. Mann A. Early testing can miss asymptomatic bacteriuria in pregnancy. *Obstet Gynecol News*. Int Med News Group 2001.
13. Golan A, Wexler S, Amit A, Gordon D and David MP. Asymptomatic bacteriuria in normal and high-risk pregnancy. *Euro J Obstet Gynecol Rep Biol*; 1989; 33: 202-208.
14. Bachman JW, Heise RH, Naessens JM and Timmerman MG. A study of various tests to detect asymptomatic urinary tract infections in an obstetric population. *JAMA* 1993; 270(16): 1971-1974.
15. Stamm WE, Counts GW, Running KR, Fhin S, Turck M and Holmes KK. Diagnosis of coliform infection in acutely dysuric women. *N Eng J Med* 1982; 307(8): 463-468.
16. Neu HC. Urinary tract infections. *Am J Med* 1992; (Suppl 4A): 63-69.
17. Iqbal M, Jaffery T and Shah SH. Isolated pleural fluid lactic dehydrogenase level: A cost effective way of characterizing pleural effusion. *J Ayub Med Coll* 2002; 14(2): 2-5.
18. Hooton TM, Scholes D, Stapleton AE, Roberts PL, Winter MSC, Gupta K, Samadpour M, Stamm WE. A prospective study of asymptomatic bacteriuria in sexually active young women. *N Engl J Med* 2000; 343(14): 992-997.
19. Kincaid-Smith P, Bullen M. *The Lancet*. Feb 1965. 1965; 1: 395-399.
20. Loo SYT, Scottolini AG, Luangphinth S, Adam AL, Jacobs LD and Mariani AJ. Urine screening strategy employing dipstick analysis and selective culture: An evaluation. *AJCP* 1984; 81(5): 634-642.
21. Lenke RR and VanDorsten JP. The efficacy of the nitrite test and microscopic analysis in predicting urine culture results. *Am. J. Obstet. Gynecol* 1981; 140:427.
22. Smith MBH. Screening for urinary infection in asymptomatic infants and children. In: *Canadian Task Force On the Periodic Health Examination. Canadian Guide to Clinical Preventive Health Care*. Ottawa Health Canada 1994: 220-230.

**Address for correspondence:**

Dr. Aziz Marjan Khattak  
 Assistant Professor  
 Department of Pathology  
 Gomal Medical College, D.I. Khan