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Original Research Article

## The bacteriological assessment of urine in patients with premature rupture of membranes

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### ABSTRACT

**Background:** PROM occurs in 10% of all pregnancies. Urinary tract infections (UTIs) are the most common bacterial infections in pregnancy. Asymptomatic bacteriuria (ASB), occurring in 2-11% of pregnancies, is a significant predisposition to the development of pyelonephritis and UTI, which are associated with obstetrical complications, such as preterm labor and low birth weight infants.

**Methods:** This study was carried out at the Department of Obstetrics and Gynaecology, Mymensingh Medical College Hospital, Mymensingh, Bangladesh, over a period of 6 Months from July 2011 to December 2011.

**Results:** A total of 100 patients of PROM were included in this study within this period. The mean age was  $27.10 \pm 4.49$  (SD) years in patients' of PROM, and the prevalence of gestational week was found at 26 (26%) at 30 weeks, 20 (20%) at 32 weeks, 22 (22%) at 33 weeks, 28 (28%) were at 34 weeks, and 4 (4%) were at 39 weeks. Most of the cases were no growth (84%), *E. coli* (12%), *Streptococcus* (2%), *Candida* (1%), and anaerobs (1%). 52% were preterm, and 42% were term delivery. 40% developed chorioamnionitis, 10% developed puerperal sepsis, and 8% developed DIC, and this prospective observational study revealed that 16% of cases of PROM patients' were associated with urinary tract infection.

**Conclusions:** This study was undertaken to determine the bacteriological assessment of urine of patient's with premature rupture of membrane. It is found that 16% of patients' with PROM have urinary tract infection with *E. coli*, Group B *streptococcus*, anaerobs, and candida organisms.

**Keywords:** Urinary tract infections, PROM, *E. coli*, Chorioamnionitis, Obstetrical complications

### INTRODUCTION

Premature rupture of the membrane is defined as rupture of the membrane prior to the onset of labor.<sup>1</sup> In approximately 10% of all pregnancies, complicating PROM was estimated that 30 to 40% of the preterm deliveries are one of the most common underlying causes of preterm delivery and perinatal death.<sup>2</sup> Premature rupture of membrane (PROM) is the single most common diagnosis associated with preterm delivery.

PROM is preterm when it occurs before 37 weeks gestation.<sup>3</sup> The main clinical concern of PROM patients

due to infections in the urinary tract, like group B streptococci, is that the baby will have a life-threatening infection in the bloodstream, lungs, or brain. If a baby is premature, then there is an increased risk of long-term complications and/or death.

One of the most common complications of preterm PROM is premature delivery. The latent period, which is the time from membrane rupture until delivery, generally is inversely proportional to the gestational age at which PROM occurs. When PROM occurs too early, surviving neonates may develop sequelae such as malpresentation, cord compression, oligohydramnios, necrotizing

enterocolitis, neurologic impairment, intraventricular hemorrhage, and respiratory distress syndrome.<sup>4,5</sup> Some of the frequent microorganisms associated with premature rupture of membranes and preterm labour are *Chlamydia trachomatis*, *Mycoplasma hominis*, *Ureaplasma urealyticum*, and beta-haemolytic group B streptococcus (GBS). Some information may lead to concluding that the presence of UTI (clinical or subclinical) may be responsible for the occurrence of PROM and subsequent preterm delivery in a significant number of pregnant women.

PROM is still an important perinatal problem. It is defined as the rupture of the fetal membranes at least one hour before labor starts at any time during pregnancy. PROM is associated with infectious and non-infectious factors. Non-infectious factors are mechanical (vaginal examination, coitus, amniocentesis, intra-amniotic catheter), cervical incompetence, ascorbic acid, zinc, and copper deficiency, preterm labor, and increased intraamniotic pressure (polyhydramnios, multiple gestations). This factor may act synergistically with abnormal microbial flora of the reproductive tract and urinary tract infection, which is perhaps more important than non-microbial factors in PROM.<sup>6</sup> Controversy exists regarding the association between asymptomatic bacteriuria during pregnancy and adverse perinatal outcomes, including preterm deliveries and low-birth weight.<sup>7</sup>

UTI are the most common medical complication of pregnancy. Asymptomatic bacteriuria is the most prevalent of these infections, and it is defined as the finding of greater than (100,000) colony-forming units per ml of clean catch urine specimens or one catheterization specimen. Lower colony counts in asymptomatic women usually represent contamination.<sup>8</sup> The physiologic changes of pregnancy predispose women to bacteriuria. These physiological changes include urinary retention from the weight of the enlarging uterus and urinary stasis due to ureteral smooth muscle relaxation (caused by increases in progesterone). In addition, glycosuria and amino aciduria during pregnancy provide an excellent culture medium for bacteria in areas of urine stasis and short female urethra, causing UTIs to become a common occurrence for pregnant women.<sup>9</sup>

The organisms that cause UTIs during pregnancy are the same as those found in non-pregnant patients. *Escherichia coli* accounts for 80 to 90 percent of infections. Other gram-negative rods, such as *Proteus mirabilis* and *Klebsiella pneumoniae*, are also common. Gram-positive organisms such as group B streptococcus and *Staphylococcus saprophyticus* are less common causes of UTI.<sup>10</sup> Urogenital infection is the single most common identifiable risk factor for PROM. Three lines of epidemiologic evidence strongly support this association: (a) women with PROM are significantly more likely than women with intact membranes to have pathogenic microorganisms in the amniotic fluid, (b) women with PROM have a significantly higher rate of histologic

chorioamnionitis than those who deliver preterm without PROM, and (c) the frequency of PROM is significantly higher in women with certain lower genital tract infections (e.g., bacterial vaginosis) and urinary tract infection than in uninfected women. Many microorganisms that colonize the lower genital tract can produce phospholipases, which can stimulate the production of phospholipids and thereby lead to the onset of uterine contractions. The diagnosis of PROM requires a thorough history, physical examination, and selected laboratory studies. Patients often report a sudden gush of fluid with continued leakage. Physicians should ask whether the patient is contracting, bleeding vaginally, has had intercourse recently, or has a fever. Verifying the patient's estimated due is important because this information will direct subsequent treatment. When preterm PROM is suspected, it is important to avoid performing a digital cervical examination; such examinations have been shown to increase morbidity and mortality.<sup>11,12</sup>

## METHODS

This study was a prospective observational study. This study was carried out at the Department of Obstetrics and Gynaecology, Mymensingh Medical College Hospital, Mymensingh, Bangladesh over a period of 6 (Six) months, from July 2011 to December 2011. Patients who were hospitalized with PROM (preterm or term) in the above mention place were the study population. The eligibility criteria of the study population were given below.

### Inclusion criteria

Patients with following characteristics were included in the study (a) gravid women both Primi and multi; (b) pregnancy more than 28 weeks duration; and (c) spontaneous rupture of membrane before initiation of labour.

### Exclusion criteria

Patients with high risk patient as hypertensive disorder of pregnancy, pregnancy with cardiac disease and pregnancy with diabetes mellitus were excluded from this study. 100 cases were taken and samples were taken by purposive method for this study. The variables studied were maternal age, gestational age, antenatal checkup, parity, maternal outcome, fetal outcome, method of delivery, bacteriological presentation of urine culture. Presenting symptoms were pregnancy for certain period, paravaginal watery discharge, lower abdominal pain other symptoms. The risk factors were lower urogenital infection, polyhydramnios, multiple pregnancy, previous operation in the cervix, incompetence of the cervix, previous P-PROM and PROM, haemorrhage in current pregnancy, and smoking. Keeping compliance with Helsinki Declaration for Medical Research Involving Human Subjects 1964, all patients were informed verbally about the study design, the objective of the study, and right for the participant to withdraw from the project at any time,

for any reason, what so ever. Written consent was obtained from each subject. A structured data collection form was developed containing all the variables of interest which was finalized following pretesting. Data were collected by interview, observation, clinical examination and biochemical investigations. Data were processed and analyzed using SPSS (Statistical Package for Social Science). The test statistics were Chi-square ( $\chi^2$ ) test and student's t test. The level of significance was set at 0.05.

## RESULTS

A total of 100 patients were consecutively included in the study. Table 1 demonstrates that patients with 20-30 years was predominant in PROM patients. Table 2 shows gestational age, 26 (26%) were at 30 weeks, 20 (20%) were

at 32 weeks, 22 (22%) were at 33 weeks, 28 (28%) were at 34 weeks and 4 (4%) were at 39 weeks.

Table 3 displays 64 (64%) patients were taken regular antenatal check and 36 (36%) were irregular checkup. Here it is found that 68(68%) patients start labor pain spontaneously. In our study half of the women 50 (50%) had para 1. 62 (62%) patients had slight liquor and 38 (38%) had profuse liquor. Above Table 7 shows majority 76 (76%) of the women were delivered by caesarean section. Here, total 16 patients out of 100 PROM patients were admitted in hospital with urinary tract infection. Here, Table 10 shows 84 (84%) had no growth, 12 (12%) were *E. coli*, 2 (2%), group B *streptococcus*, 1 (1%) were *Candida*, 1(1%) was anaerobes.

**Table 1: Age distribution of patients.**

Age (years)	N	%	Mean±SD
<20	12	12	27.10±4.49
20-25	26	26.0	
26-30	48	48.0	
31-35	14	14.0	
36-40	00	00	
<b>Total</b>	100	100	

**Table 2: Distribution of gestational weeks.**

Gestational age (weeks)	N	%	Mean±SD
30	26	26.0	32.54±2.03
32	20	20.0	
33	22	22.0	
34	28	28.0	
39	04	4.0	
<b>Total</b>	100	100	

**Table 3: Distribution of antenatal check-up.**

Antenatal check-up	N	%
<b>Regular</b>	64	64
<b>Irregular</b>	36	36
<b>Total</b>	100	100

**Table 4: Initiation of labour.**

Initiation of labour	N	%
<b>Spontaneous</b>	68	68
<b>Induced</b>	32	32
<b>Total</b>	100	100

**Table 5: Distribution of parity.**

Parity	N	%
<b>Null parity</b>	26	26.0
<b>1</b>	50	50.0
<b>2 or more</b>	24	24.0
<b>Total</b>	100	100

**Table 6: Drainage of liquor.**

Drainage of liquor	N	%
<b>Slight</b>	62	62.0
<b>Profuse</b>	38	38.0
<b>Total</b>	100	100

**Table 7: Method of delivery.**

Method of delivery	N	%
<b>Vaginal</b>	24	24.0
<b>Caesarean section</b>	76	76.0
<b>Total</b>	100	100

**Table 8: Distribution of preterm and term delivery.**

Types of PROM	N	%
<b>10</b>	52	52.0
<b>Term</b>	48	48.0
<b>Total</b>	100	100

**Table 9: Distribution of UTI among PROM patients.**

Types of PROM	N	N of UTI infected PROM patients	%
<b>Preterm</b>	52	10	19.23
<b>Term</b>	48	6	12.5
<b>Total</b>	100	16	16

**Table 10: Bacteriological presentation of urine culture of the study subject.**

Organism	N	%
<b>No growth</b>	84	84
<b><i>E. coli</i></b>	12	12
<b>Group B streptococcus</b>	02	02
<b><i>Candida</i></b>	01	01
<b>Anaerobes</b>	01	01

## DISCUSSION

This prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Mymensingh Medical College Hospital, Mymensingh, Bangladesh, for 6 months from July 2011 to December 2011. A total of 100 cases were taken in a purposive way.

We found 12% were age group <20 years, 26% were age group 20-25 years, 48% were age group 26-30 years, and 14% were age group 31-35 years. The Mean  $\pm$  SD was 27.10 $\pm$ 4.49. Kilpatrick et al. also found mean $\pm$ SD 26.2 $\pm$ 5.8 years.<sup>13</sup> Another study by Tanir et al showed that mean $\pm$ SD was 27.0 $\pm$ 1.0 years.<sup>14</sup> This study demonstrates that the gestational age of 26% was 30 weeks, 20% were 32 weeks, 22% were 33 weeks, 28% were 34 weeks, and 4% were 39 weeks, respectively. Mean $\pm$ SD was 32.54 $\pm$ 2.03. Tanir et al showed gestational age mean $\pm$ SD was 32.7 $\pm$ 1.2.<sup>14</sup> Our study recorded that 26% of patients had null para, 50% had para 1, and 24% had para 2.

However, Kilpatrick et al study showed 61.8% had no parity.<sup>13</sup> Again, we found 16% of patients with urinary tract infections, whereas Kilpatrick et al found 7.8% were urinary tract infections in their study.<sup>13</sup> This study showed 68% delivered spontaneously, and Dudley et al found 57% were spontaneous.<sup>15</sup>

Our 24% of patients experienced vaginal delivery, but a maximum of 76% required caesarean section. Bengston et al found 40% were caesarean sections, and Jennifer et al found 12.7% of caesarean sections in their gestation age was 26 weeks.<sup>16,17</sup> Another study by Tanir et al showed 53.8% were vaginal delivery and 46.2% were caesarean section.<sup>14</sup>

This study found that 52% were preterm and 48% were term delivery, whereas Miller et al identified no differentiation was preterm and term delivery in premature membrane rupture.<sup>18</sup> However, Ziaei et al determined that bacterial vaginosis is a common vaginitis in term

pregnancy.<sup>19</sup> Still, he could not find any relationship between bacterial vaginosis and premature rupture of membranes at term. Our study finally summarized that 84(84%) did not face any growth of bacteria, but 12 (12%) met *E. coli* infection, (2%) with group B *streptococcus*, 1 (1%) were *Candida*, and 1 (1%) were anaerobes. Roucelie Schultz et al also found 14% *E.coli*, 2 (2%) group positive *bacilli*, 3% Group negative *bacilli*, 4% other, 15% unspecified or unknown organism.<sup>20</sup>

### Limitations

Following limitations were considered in this study: (a) for a woman with preterm PROM and a viable fetus, the safety of expectant management at home has not been established; (b) as this study was conducted in a small scale, these results may not represent of all patients; and (c) lack of fund and logistic support.

### CONCLUSION

This study was undertaken to determine the bacteriological assessment of urine of patient's with premature rupture of membrane. It is found that 16% of patients' with PROM have urinary tract infection with *E. coli*, group B *Streptococcus*, *Anaerobs*, and *Candida* organisms.

### Recommendation

Following recommendations are laid down to reach to a rational decision: (a) biochemical, biophysical and microbiological parameters should be available for proper diagnosis of the PROM; (b) appropriate antibiotics should be given prophylactically for prevention of intrapartum infection (*Chorioamnionitis*) in case of PROM; (c) patients with PROM before 32 weeks of gestation should be cared for expectantly until 33 completed weeks of gestation if no maternal or fetal contraindications exist; (d) a single course of antenatal corticosteroids should be administered to women with PROM before 32 weeks of gestation to reduce the risks of respiratory distress syndrome (RDS), perinatal mortality, and other morbidities; (e) delivery is recommended when PROM occurs at or beyond 34 weeks of gestation; and (f) with PROM at 32 to 33 completed weeks of gestation, labor induction may be considered if fetal pulmonary maturity has been documented.

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