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Association of Premature Rupture of Membrane and Urinary Tract Infection among Pregnant Women

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Abstract

Background: Prelabour rupture of membranes among pregnant women is a common obstetrics problem encountered by the obstetricians. **Objective:** This present study was aimed to see the association of premature rupture of membrane and urinary tract infection among pregnant women. **Methodology:** This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology at Enam Medical College, Savar, Dhaka, Bangladesh from January 2022 to December 2022 for a period of one year. Pregnant women with preterm premature rupture of membrane who were admitted in the Department of Obstetrics & Gynaecology at Enam Medical College, Savar, Dhaka, Bangladesh were selected as study population. Gravid women both primi & multi with preterm premature rupture of membrane, pregnancy of more than 23 weeks' duration & less than 37 weeks or spontaneous rupture of the membranes were included in this study. All the clinical parameters, feto-maternal outcomes were recorded. **Results:** A total number of 83 pregnant women presented with premature rupture of membrane were recruited for this study. The mean with SD of the study population were 25.3±4.46 years with the range of 17 to 38 years. The most common comorbidities among the study population was urinary tract infection which was 78(94.0%) cases. In this study previous history of cesarean section was found in 28(33.7%) cases. **Conclusion:** In conclusion women presented with premature rupture of membrane is significantly associated with urinary tract infection. *[Journal of National Institute of Neurosciences Bangladesh, January 2024;10(1):32-37]*

Keywords: Clinical parameters; obstetrical management; premature rupture of membrane; pregnant women; urinary tract infection

Introduction

Premature rupture of membranes (PROM) is the spontaneous rupture of the membranes any time after the 28th week of pregnancy but before the onset of labor[1]. When rupture of the membranes occurs beyond the 37th week but before the onset of labor, it is called term premature rupture of membranes and when it occurs before 37 completed weeks, it is called preterm premature rupture of membranes[2]. Therefore, premature rupture of membrane refers to the disruption of fetal membranes before the beginning of labor, resulting in spontaneous leakage of amniotic fluid. Premature rupture of membrane which occurs prior to 37 weeks of gestation, defined as preterm premature rupture of membrane as premature rupture of membrane that occurs after 37 weeks' gestation defined as term premature rupture of membrane[3]. Premature rupture of membrane occurs in approximately 5.0% to 10.0% of all pregnancies, of which approximately 80.0% occur at term[4].

The complication risk of premature rupture of membranes is increased if the mother has previous premature rupture of membranes, low body mass index, concomitant infection of the gestational tissues, and longer the time elapsed between the rupture and delivery[5-11]. premature rupture of membranes has essential significance for the further fate of pregnancy. Late diagnosis means wasted opportunity of appropriate

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intervention. In most cases, the diagnostics does not cause bigger problems, but in some situations it may not be easy to make the right diagnosis.

Urinary tract infection is a common problem in pregnancy which can be classified as lower like cystitis and asymptomatic bacteriuria or upper (pyelonephritis) tract infections[12]. The anatomical, hormonal changes, also increased plasma volume during pregnancy decreases urine concentration and pregnant women may develop glucosuria, which leads to increased bacterial growth in the urine. Therefore, the pregnant women are more prone to UTI than the nonpregnant7. Maternal UTI can be either symptomatic or asymptomatic. The presence of symptomatic UTI is associated with an increased risk of intrauterine growth retardation (IUGR) and low-birth weight (LBW).

The high incidence of UTIs during pregnancy is related to the abnormal anatomical-physiological changes that occur during this period, such as compression of the ureter by uterine dextrorotation, higher prevalence of vesicoureteral reflux, hydroureter and the alkalinization of the vaginal pH. All of these conditions may predispose the patient to develop from an asymptomatic UTI into a symptomatic infection[13-17]. Thus, this present study was aimed to see the association of premature rupture of membrane and urinary tract infection among pregnant women.

Methodology

Study Design and Population: This was a cross-sectional study. The study was conducted in the Department of Obstetrics & Gynaecology at Enam Medical College, Savar, Dhaka, Bangladesh. This was carried out from January 2022 to December 2022 for a period of one year. Pregnant women with preterm premature rupture of membrane who were admitted in the Department of Obstetrics & Gynaecology at Enam Medical College, Savar, Dhaka, Bangladesh were selected as stdudy population. Gravid women both primi & multi with preterm PROM, pregnancy of more than 23 weeks' duration & less than 37 weeks or spontaneous rupture of the membranes were included in this study. Women who were admitted with the term premature rupture of membrane with established labour, ruptured membranes with antepartum hemorrhage, ruptured membranes with 37 completed weeks or ruptured membrane with infection were excluded from this study.

Study Procedure: After admission, full history was taken including duration of pregnancy, time and onset of rupture of membranes, past history of rupture of membranes, past obstetric history, social class, and personal history including coital habits. Gestational age was determined from L.M.P. and from early ultrasonography. Examination comprises a recording of pulse, blood pressure, temperature, fundal height and fetal conditions. Documentation of membranes rupture had to be made by a sterile speculum examination, visualizing the flow of the amniotic fluid from the cervical os and/or its pooling in posterior vaginal fornix following fundal pressure, typical smell and staining with litmus paper. During speculum examination high vaginal swab was taken for bacteriological study. Plan of management was decided according to presence or absence of active labour, duration of membranes rupture, congenital fetal anomaly, intervention already made and sign symptoms of chorioamnionitis like maternal temperature above 100.4^{o}F, maternal tachycardia, fetal tachycardia, uterine tenderness, foul-smelling vaginal discharge and maternal leukocytosis.

Statistical Analysis: Data were collected by a standard questionnaire. All data were checked and were analyzed after collection. Then the data were entered into a computer and were analyzed using simple statistical methods. Some statistical calculation and percentage was done by using a scientific calculation, and the finding was arranged in tabular form. Descriptive analyses of frequencies, median, mean, minimum and maximum for continuous variables and percentages for categorical variables were performed using SPSS version 27.0 (Windows Based Software). Then, univariate logistic regression analysis was used to examine the relationship between the proposed predictors and maternal and fetal outcomes. Those variables, which revealed a statistically significant association in univariate logistic regression analysis, were entered into multivariable logistic regression to identify variables independently associated with maternal and fetal outcomes. Ninety-five percent CI with a respective odd ratio was used to assess the statistical significance of association among the variables. P value less than 0.05 was used as a cutoff point to see the presence of statistically significant association.

Ethical Clearance: Ethical clearance for the study was obtained from the ethics committee of Jimma University College of Health Science. To protect patient confidentiality, the name of mothers on the record was excluded from the extracted data. Thus, the information obtained from the records was anonymous. All procedures of the present study were carried out in

accordance with the principles for human investigations (i.e., Helsinki Declaration) and also with the ethical guidelines of the Institutional research ethics. Formal ethics approval was granted by the Ethics Review Committee of Local Institute. Participants in the study were informed about the procedure and purpose of the study and confidentiality of information provided. All participants consented willingly to be a part of the study during the data collection periods. All data were collected anonymously and analyzed using the coding system.

Results

A total number of 83 pregnant women presented with premature rupture of membranes were recruited for this study. Most of the women were in the age group of 20 to 25 years of age group which was 37(44.6%) cases followed by 25 to 30 years and more than 30 years of age group which were 24(28.9%) cases and 12(14.5%) cases respectively. Only 10(12.0%) cases were found in less than 20 years of age group. The mean with SD of the study population were 25.3±4.46 years with the range of 17 to 38 years (Table 1).

Table 1: Age Group of the Study Population (n=83)

Age Group	Frequency	Percent
Less Than 20 Years	10	12.0
20 to 25 Years	37	44.6
25 to 30 Years	24	28.9
More Than 30 Years	12	14.5
Total	**83**	**100.0**
Mean±SD (Years)	25.3±4.46(17 to 38)	

Most of the women presented with premature rupture of membranes were primi which was 43.4% cases followed by 2nd gravida, 3rd gravida and 4th gravida which were 39.8% cases, 12.0% cases and 2.4% cases respectively (Figure I).

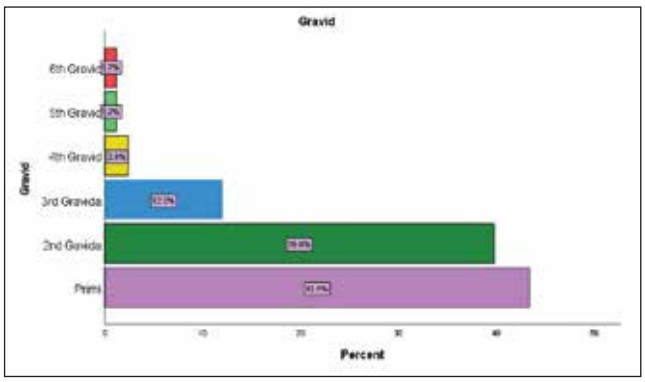

Figure I: Showing the Status of Gavida of the Pregnant Women (n=83)

The most common comorbidities among the study population was urinary tract infection which was 78(94.0%%) cases followed by Severe Oligohydramnios, gestational diabetes mellitus and hypothyroidism which were 29(34.9%%) cases, 9(10.8%%) cases and 9(10.8%%) cases respectively (Table 2).

Table 2: Comorbidities among the Study Population

Comorbidities	Frequency	Percent
UTI	78	94.0
Severe Oligohydramnios	29	34.9
GDM	9	10.8
Hypothyroidism	9	10.8

Multiple response analysis was calculated; UTI=urinary tract infection

The study population were managed by either cesarean section or normal vaginal delivery. Most of the pregnant women were managed by cesarean section which was 72(86.7%) cases and normal vaginal delivery in 11(13.3%) cases (Figure II).

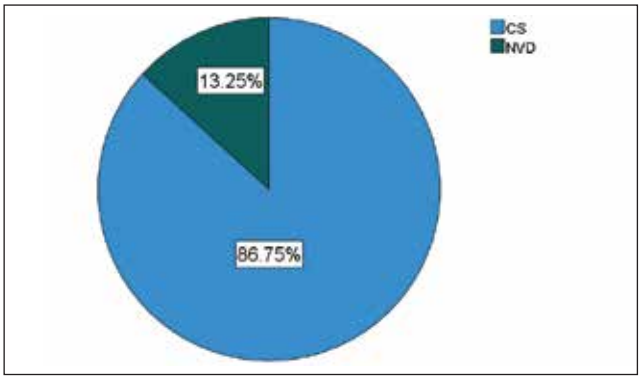

Figure II: Management of Study Population during Delivery

In this study previous history of cesarean section was found in 28(33.7%) cases. Less fetal movement was found in 13(15.7%) cases. Intrauterine growth retardation (IUGR) was reported in 5(6.0%) cases (Table 3).

Table 3: Clinical Characteristics of the Study Population

Variables	Frequency	Percent
H/O CS	28	33.7
LFM	13	15.7
IUGR	5	6.0

H/O=history of; CS= cesarean section; LFM= Less Fetal Movement; IUGR=Intrauterine Growth Retardation

Most of the pregnant women of this study were attended with PROM at 32 to 35 weeks of pregnancy

which was 47(56.6%) cases followed by 36 to 40 weeks and 28 to 31 weeks which were 27(32.5%) cases and 9(10.8%) cases respectively (Figure III).

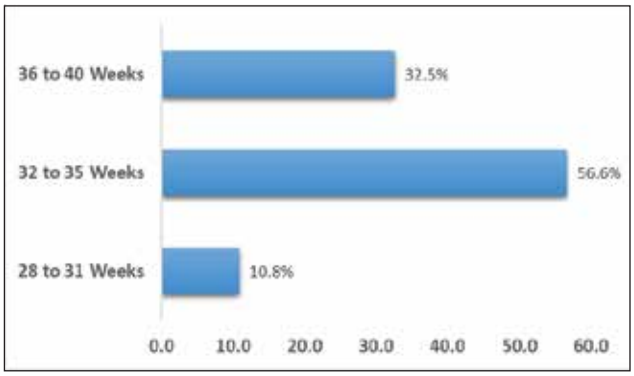

Figure III: Duration of Pregnancy in Different Time Points of PROM Presentation

In this study association of duration of pregnancy and urinary tract infection was assessed. During 28 to 31 weeks UTI was present in 9(100.0%) cases. 32 to 35 Weeks.

Table 4: Association of UTI with Duration of Pregnancy

Pregnancy	UTI		Total	P value
Duration	Present	Absent		
28 to 31 Weeks	9(100.0%)	0(0.0%)	9(100.0%)	
32 to 35 Weeks	45(95.7%)	2(4.3%)	47(100.0%)	
36 to 40 Weeks	24(88.9%)	3(11.1%)	27(100.0%)	<0.05
Total	**78(94.0%)**	**5(6.0%)**	**83(100.0%)**	

Discussion

Urinary tract infections (UTIs) are one of the most common disorders, and are extremely detrimental during pregnancy due to the possibility of maternal-fetal complications, including septicemia, intra-amniotic infection, preterm labour, premature rupture of membranes, low birth weight, intrauterine growth restriction (IUGR) and perinatal death[12-14]. Prelabour rupture of membrane is the spontaneous rupture of the membrane before the onset of labour[12]. In most cases, this occurs near term, but when membrane rupture occurs before 37 weeks' gestation, it is known as the preterm prelabour rupture of membranes. The prevalence of preterm premature rupture of membrane is 2.0% cases in China[13], 1.3% in Nigeria[14], 4.7% cases in Egypt[15], 13.8% in northwest Ethiopia[16] and 1.3% cases in Addis Ababa[17]. The prevalence of preterm and term premature rupture of membrane in Uganda is 13.8% cases[17]. Different studies revealed that the risk factors associated with premature rupture of membrane are lower genital tract infection, urinary tract infection , malpresentation, multiple pregnancies, and polyhydramnios[13,18-22].

A total number of 83 pregnant women presented with PROM were recruited for this study. Most of the women were in the age group of 20 to 25 years of age group which was 37(44.6%) cases followed by 25 to 30 years and more than 30 years of age group which were 24(28.9%) cases and 12(14.5%) cases respectively. Only 10(12.0%) cases were found in less than 20 years of age group. The mean with SD of the study population were 25.3±4.46 years with the range of 17 to 38 years

Most of the women presented with PROM were primi which was 43.4% cases followed by 2nd gravida, 3rd gravida and 4th gravida which were 39.8% cases, 12.0% cases and 2.4% cases respectively. Most of the pregnant women of this study were attended with PROM at 32 to 35 weeks of pregnancy which was 47(56.6%) cases followed by 36 to 40 weeks and 28 to 31 weeks which were 27(32.5%) cases and 9(10.8%) cases respectively. Yeasmin et al[17] have reported that maximum (61.8%) cases with PROM were primi-gravida which was almost similar (62.7%) and (53.33%) to the study done by Lovereen et al[18] and Nazneen et al[16] respectively. According to Akhter et al[20] chance of increase sexual activity and increased genital infection are the most common among primi-gravida and in their study primi-gravida were 53.0% cases. Incidence of preterm PROM in our study was 30.8% which was almost similar (29.09%) to the study by Lovereen et al[18].

The most common comorbidities among the study population was urinary tract infection which was 78(94.0%%) cases followed by severe oligohydramnios, gestational diabetes mellitus and hypothyroidism which were 29(34.9%%) cases, 9(10.8%%) cases and 9(10.8%%) cases respectively. In this study previous history of cesarean section was found in 28(33.7%) cases. Diagnosis and proper management is very important to limit various fetal and maternal complications generally due to infection. However, in countries like Bangladesh where health facilities not well organized with necessary manpower, a large number of mothers come to the facilities late.

Less fetal movement was found in 13(15.7%) cases. Intrauterine growth retardation was reported in 5(6.0%) cases The exact cause of PROM is not known and the causes could be multifactorial. There are various

factors that are related to PROM including prior preterm birth, cigarette smoking, polyhydramnios, urinary and sexually transmitted infection, prior PROM, work during pregnancy, low body mass index, bleeding, and low socioeconomic status[16,19].

Urine culture is considered to be the gold standard for diagnosing a UTI, allowing for the identification of the etiologic agent and quantification of bacteria in the urine[11]. Thus, it is essential to perform this examination during prenatal screening, because it allows for early treatment and helps to prevent future consequences for both the mother and neonate[7]. The low cost of treatment and ease of access to the population encourages the empirical use of antimicrobials, which may cause the selection of more resistant bacteria, complicating the therapy[13]. The prescription of antibiotics should be restricted to cases with a sensitivity shown in the antibiogram.

The three causes of fetal death associated with PROM are sepsis, asphyxia, and pulmonary hyperplasia[19]. Women with intrauterine infection deliver earlier than non-infected women, and infants born with sepsis have a mortality rate four times higher than those without sepsis do[9]. Ethiopia and other five countries contribute to about 50% of the maternal deaths in the globe[20]. Ethiopia has designed a number of policies and strategies to improve maternal health and reduce child mortality. However, different countries have the higher number of maternal mortality in the world. This poses the greatest challenge to attain the goal for maternal health[21].

Conclusion

In conclusion women presented with premature rupture of membrane is significantly associated with urinary tract infection. The most common comorbidity is urinary tract infection. Primi gravid women are most commonly presented with PROM. A large number of women have given the history of previous cesarean section. Therefore, proper management should be performed to implement to get good feto-maternal outcomes among these women.

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Conflict of interest: There are no conflicts of interest

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Contribution to authors: Conception and design: Khanum T, Begum S, Begum M; Acquisition, analysis, and interpretation of data: Akbar T, Shamima MTN; Manuscript drafting and revising it critically: Khanum T; Approval of the final version of the manuscript: Khanum T, Begum S, Begum M, Akbar T, Shamima MTN; Guarantor accuracy and integrity of the work: Khanum T.

Data Availability
Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate
Written informed consent was obtained from each of the patient or from legal guardian. Patient confidentiality was strictly maintained. No name, address or contact details of the patient was divulged.

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