Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-9, Issue-4 | July- August 2023
DOI: 10.53339/aimdr.2023.9.4.13
Page no- 98-104 | Section- Research Article (Gynecology)

Comparison of Transvaginal Sonographic Cervical Length with Neonatal Outcomes among Pregnant Women Presented with Preterm Premature Rupture of Membrane

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Abstract

Background: Preterm premature rupture of membranes (PPROM) is a significant complication in pregnancy, contributing to maternal, fetal, and neonatal morbidity and mortality. Identifying those at increased risk is crucial to address the problem of prematurity. Transvaginal sonography has emerged as an effective tool for assessing cervical length and predicting preterm delivery. The purpose of the present study was to compare the cervical length measured by transvaginal sonography with neonatal outcomes among pregnant women presented with premature rupture of the membrane. **Material & Methods:** This comparative cross-sectional study was conducted in the Department of Obstetrics and Gynecology at Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh, from October 2017 to April 2018 for six months. A total of 44 Women who were admitted with premature rupture of membranes after completion of 28 weeks of gestation and before 37 weeks of gestational age, irrespective of their parity and were admitted in labor and antenatal ward were selected as the study population. The study population was divided into two groups designated as Group A where the cervical length of the fetus measured by transvaginal sonography was less than 2 cm and Group B where cervical length was more than 2 cm. Each group had 28 patients respectively. The collected data were analyzed using Statistical Package for Social Sciences (SPSS), version-23, 0. Chi-square tests were performed to compare the results, between the groups where $p<0.05$ considered, the level of significance with 95% CI. The ethical clearance of this study was obtained from the Institutional Review Board (IRB) of Dhaka Medical College and Hospital (DMCH), Dhaka, Bangladesh. **Results:** A total number of 44 pregnant women were recruited for this study of which 22 cases were in group A who had the cervical length less than 2 cm and the rest of the 22 cases were in group B who had the cervical length more than 2 cm. The mean age of the patients in Group A is 25.91±3.66 years and in Group B it is 24.32±3.34 years ($P>0.05$). Mean birth weight was 1.7±0 .37kg in group A and 2.1±0.2kg in group B ($p=0.015$). In this study, 36.6% baby needed resuscitation in group A whereas only 13.6% needed resuscitation in group B. Regarding neonatal complications in group A, (22.72%) neonates had pneumonia and followed by RDS (36.36%), neonatal sepsis (9.09%), hypoglycemia (9.09%). In group B, 36.36% neonates developed complications which were pneumonia (4.55%), RDS (9.09%), neonatal sepsis (13.63%), hypoglycemia (4.55%) and others (4.55%).Regarding neonatal outcome among the study population, in group A, 1-Min Apgar score <7 was observed in 59.01%) neonates, while in group B, 7(31.81%) was observed($p=0.073$). 5- Min Apgar score <7 was observed in 18.18% neonates in group A, while in group B, 4.54% was observed ($p=0.158$) In group A, (77.27%) neonates needed to be admitted to NICU, while in group B, 36.36% neonates needed to be admitted to NICU($p=0.006$). In group A, 77.27% neonates had complications whereas, in group B, only 36.36% neonates had complications ($p=0.006$).

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Received: 27 April 2023
Revised: 20 May 2023
Accepted: 02 June 2023
Published: 30 June 2023

Both in group A and in B, no neonatal death was observed. **Conclusion:** In conclusion, neonatal complications are significantly associated with the cervical length measured by transvaginal sonography with perinatal outcomes among pregnant women presented with premature rupture of the membrane.

Keywords:- Transvaginal, Sonography, Cervical-length, Pregnant, Women.

INTRODUCTION

Preterm premature rupture of membranes (PPROM) complicates 1.0% to 3.0% of all pregnancies.[1] It is the presenting symptom in approximately 30.0% of all preterm deliveries.[2] Preterm PROM is associated with potential maternal, fetal, and neonatal morbidity and mortality.[3,4] Given the strong association between perinatal outcome and gestational age at birth, most of the interventions studied were aimed at prolonging pregnancy after the rupture has occurred, despite the increased risk of neonatal and maternal infection.[5,6,7] The mean duration of the latency period following Preterm PROM has been reported to range from 7 to 10 days.[8,9] Preterm birth is the leading cause of perinatal morbidity and mortality.[5] Despite advances in perinatal care, the incidence of preterm birth continues to rise, primarily because of the increased multiple pregnancies resulting from assisted reproduction.[10] Tocolytics prolong pregnancy minimally once preterm labor has begun, and they can be associated with significant undesirable maternal, fetal, and neonatal consequences.[11] To address the prematurity problem, it is important to identify those at increased risk. The incidence of preterm PROM and neonatal complications is unacceptably high in a developing country.[12] Preterm premature rupture of membranes (PPROM) is a breach of the chorioamnionitis membrane before the onset of labor at less than 37 weeks of gestation. Preterm premature rupture of membranes (PPROM) complicates 1.0% to 4.0% of pregnancies and accounts for 45.0% of preterm deliveries and 20.0% of perinatal mortality.[11,12] To address the prematurity problem, it is important to identify those at increased risk. In the absence of clinical or biological signs of chorioamnionitis, management of affected pregnancies is usually expectant.[13] Transvaginal ultrasonographic cervical length assessment is a safe and effective technique to predict the increased risk of preterm delivery.[14] The transvaginal route appears to be the well-studied and is acceptable to women. It can also be used to prevent unnecessary interventions in women at increased risk of preterm delivery which in some circumstances, leads to interventions that may reduce the rate of pre-term birth.[15] The purpose of the present study was to compare the cervical length measured by transvaginal sonography with neonatal outcomes among pregnant women presented with premature rupture of the membrane.

MATERIAL AND METHODS

This observational comparative study was conducted at the Department of Obstetrics and Gynecology, Dhaka Medical College Hospital in Dhaka, Bangladesh, from October 2017 to April 2018. The study included 44 women admitted with premature rupture of

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membranes (PROM) between 28 and 37 weeks of gestation. The participants were divided into two groups based on their cervical length measured by transvaginal sonography: group A (cervical length < 2 cm) and group B (cervical length > 2 cm). Both the groups had 22 patients respectively. Informed written consent was obtained from all participants. The study included singleton pregnancies with PROM confirmed by clinical examination and tests, with certain exclusions. Data on variables such as age, cervical length, and neonatal outcomes were collected using a pre-structured questionnaire and a case record form. Premature rupture of membranes was defined as the spontaneous rupture of the membranes after the 28th week of gestation but before the onset of labor. Preterm premature rupture of membranes (PPROM) referred to membrane rupture before 37 weeks of gestation without labor. Collected data were analyzed using Statistical Package for Social Sciences (SPSS), version-23, 0. Descriptive inferential statistical analysis were performed and the results were performed in frequency and percentage. Chi-square tests, unpaired t test, and comparison of ratio tests were performed to compare the results, between the groups where $p<0.05$ considered, the level of significance with 95% CI. The ethical clearance of this study was obtained from the Institutional Review Board (IRB) of Dhaka Medical College and Hospital (DMCH), Dhaka, Bangladesh.

Inclusion Criteria

- Women admitted with premature rupture of membranes (PROM) after completing 28 weeks of gestation and before 37 weeks of gestational age

Exclusion Criteria

- Presence of clinical chorioamnionitis at admission, as defined by Gibbs and colleagues (temperature > 37.8°C plus uterine tenderness, fetal or maternal tachycardia, malodorous vaginal discharge, leukocytosis > 15,000/mm3).
- Fetal distress at fetal heart monitoring at admission, characterized by persistent tachycardia or bradycardia.
- Pregnant women with heart disease, jaundice, pre-eclampsia, or eclampsia.

RESULTS

A total number of 44 pregnant women were recruited for this study of which 22 cases were in group A who had the cervical length less than 2 cm and the rest of the 22 cases were in group B who had the cervical length more than 2 cm. The majority of the study population was in the age group of 26 to 30 years and 21 to 25 years which were 10(45.45 %) cases and 11 (50.0%) cases in group A and group B respectively. The mean age of the patients in Group A is 25.91±3.66 years and in Group B it is 24.32±3.34 years (P >0.05).

Table 1: Age distribution of the patients (N=44).

Age Group	Group A (N=22)	Group B (N=22)	P- value
15 to 20 Years	3 (13.64%)	3 (13.64%)	*0.123
21 to 25 Years	8(36.36%)	11 (50.0%)	
26 to 30 Years	10(45.45 %)	8 (36.36%)	
31 to 35 Years	1 (4.55%)	0(0.00%)	

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Total	22(100.0%)	22(100.0%)	
Mean± SD	25.91±3.66	24.32±3.34	**0.231

Group A (cervical length <2cm);
Group B (cervical length >2cm); Statistical analysis was done by **unpaired student t-test and *Chi-square test.

Table 2: Birth Weight of the Neonates (N=44).

Mode of Delivery	Group A (N=22)	Group B (N=22)	P- value
Less Than 2kg	15(68.18%)	6(27.27%)	0.015
2.1 to 2.4kg	7(31.82%)	16(72.73%)	
Total	22(100.0%)	22(100.0%)	

Statistical analysis was done by Chi-square test;
Group A (cervical length <2cm); Group B (cervical length >2cm)
Mean birth weight was 1.7±0 .37kg in group A and 2.1±0.2kg in group B.

Table 3: Resuscitation required for the neonates (N=44).

Resuscitation	Group A (N=22)	Group B (N=22)	P- value
Need Resuscitation	5(22.73%)	3(13.64%)	0.434
No Resuscitation	17(77.27%)	19(86.36%)	
Total	22(100.0%)	22(100.0%)	

Statistical analysis was done by Chi-square test;
Group A (cervical length <2cm); Group B (cervical length >2cm)
In this study, 36.6% baby needed resuscitation in group A whereas only 13.6% needed resuscitation in group B.

Table 4: Neonatal Complications among the Study Population (N=44).

Neonatal Complications	Group A (N=22)	Group B (N=22)	P- value
Pneumonia	5(22.72%)	1(4.55%)	0.034
ARDS	8(36.36%)	2(9.09%)	
Neonatal Sepsis	2(9.09%)	3(13.63%)	
Hypoglycemia	2(9.09%)	1(4.55%)	
Others	0(0.00%)	1(4.55%)	

Statistical analysis was done by Chi-square test;
Group A (cervical length <2cm); Group B(cervical length >2cm);
ARDS=acute respiratory distress syndrome

Regarding neonatal complications in group A, (22.72%) neonates had pneumonia and followed by RDS (36.36%), neonatal sepsis (9.09%), hypoglycemia (9.09%). In group B, 36.36% neonates developed complications which were pneumonia (4.55%), RDS (9.09%), neonatal sepsis (13.63%), hypoglycemia (4.55%) and others (4.55%).

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Table 5: Neonatal Outcome among the Study Population (N=44).

Neonatal Outcome	Group A (N=22)	Group B (N=22)	Difference (%)	P- value
1-Min Apgar score <7	13(59.01%)	7(31.81%)	27.20	0.073
5- Min Apgar score <7	4(18.18%)	1(4.54%)	13.64	0.158
Admission to NICU	17(77.27%)	8(36.36%)	40.91	0.006
No Complications	5(22.72%)	14(63.63%)	40.91	0.006
Complication	17(77.27%)	8(36.36%)	35.91	0.018
Neonatal death	0%	0%	0.00	1.000

Regarding neonatal outcome among the study population, in group A, 1-Min Apgar score <7 was observed in 59.01%) neonates, while in group B, 7(31.81%) was observed(p=0.073). 5-Min Apgar score <7 was observed in 18.18% neonates in group A, while in group B, 4.54% was observed (p=0.158) In group A, (77.27%) neonates needed to be admitted to NICU, while in group B, 36.36% neonates needed to be admitted to NICU(p=0.006). In group A, 77.27% neonates had complications whereas, in group B, only 36.36% neonates had complications (p=0.006). Both in group A and in B, no neonatal death was observed.

DISCUSSION

Clinically, the use of transvaginal ultrasonographic assessment of the cervix in cases of PPROM for better prediction of the time interval between the occurrences of ROM to delivery may assist in better decisions concerning in-utero transfer of neonates to better neonatal centers with advanced neonatal facilities as well as for the administration of corticosteroids for the fetus lung maturation.[11] Expectant management of PPROM culminates in either spontaneous preterm delivery, indicated preterm delivery because of maternal or fetal complications like chorioamnionitis, placental abruption, preeclampsia, fetal growth restriction, or labor induction when the risks of expectant management are believed to outweigh those associated with prematurity.[12] The mean age of the patients with cervical length less than 2cm is 25.91±3.66 years and 24.32±3.34 years in women with cervical length more than 2cm it is 24.3 ±3.34 years (P >0.05). This is comparable with the mean age reported in other studies, which ranges from 20-30 years, Rizzo et al,[13] and Mehra et al.[14] Test et al,[15] mentioned that maternal age of more than 35 years was associated with a longer latency period. On the other hand, Aziz et al,[16] showed maternal age of more than 35 years was associated with a shorter latency period. In this study mean birth weight was significantly (P=0.03) lower (1.7±0 .37kg vs. 2.1±0.2kg) in women with cervical length less than 2 cm. This may be because most of the babies were born preterm in this study. This result is comparable with previous study Suwan et al,[14] Rizzo et al,[13] Gire et al.[17] Since most of the neonates were preterm and had low birth weight in women with cervical length less than 2 cm about 36.6% baby needed resuscitation whereas only 13.6% needed resuscitation in women with cervical length more than 2 cm. Therefore, the need for resuscitation was significantly (p=0.01) higher in women with cervical lengths less than 2 cm. regarding neonatal complications, more complications were found (77.28% vs 36.37%) in women with cervical lengths less than 2 cm and

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more than 2 cm respectively. Common complications found in women with cervical length less than 2 cm were pneumonia (22.72% vs 4.55%), respiratory distress syndrome (36.36% vs 9.1%), hypoglycemia (9.1% vs 4.55%) but neonatal sepsis (9.09% vs 13.63%) and others (0% vs 4.55%) were more in women with cervical length more than 2 cm. There are some limitations of this study. Although optimum care has been taken by the researcher in every step of this study, still some limitations existed. The study was conducted in a selected institute, so the study population might not represent the whole community. Despite the maximum effort by the researcher due to time and resource limitations, the sample size was small; a larger sample size would have given a better result. Certain information was recorded as per the statement of the patient, such as age, occupation, the income of the family, past obstetric history, etc. which might not be that accurate in some of the cases. The majority of the babies who were admitted to the hospital due to complications left the hospital by discharge on risk bond due to financial problems and a lack of taking care personnel. So actual outcome of neonates could not be observed.

CONCLUSIONS

In conclusion, neonatal complications are significantly associated with the cervical length measured by transvaginal sonography with perinatal outcomes among pregnant women presented with premature rupture of the membrane. Moreover, neonatal complications are more in more than 2cm cervical length than less than 2cm. acute respiratory distress syndrome and pneumonia are the most common neonatal complications found among the less than 2 cm cervical length group of pregnant women. However, the resuscitation is less than 2 cm cervical length group. Further large-scale studies should be conducted.

Recommendation

Transvaginal ultrasound assessment of the cervix can help predict time between premature rupture of membranes (PROM) and delivery, aiding in decisions for neonatal transfer and corticosteroid administration. Expectant management of PROM should consider maternal and fetal complications. Cervical length less than 2cm is associated with lower birth weight and higher need for resuscitation, while length over 2cm has fewer complications. More studies are needed to validate these findings. Healthcare providers should consider these factors to improve perinatal outcomes in PROM cases.

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Source of Support: Nil, Conflict of Interest: None declare