Rupture of Fetal Membranes Among Women Accessing Maternity Care in the University of Calabar Teaching Hospital: A 5 Year Review

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ABSTRACT

Prelabour rupture of membranes (PROM) is the rupture of membranes before labour begins. Complications are increased in PROM because of the increased risk of infection, preterm labour and prematurity. The aim of this study was to determine the prevalence, risk factors and complications of prelabour rupture of membranes (PROM) in women accessing maternity care at the University of Calabar Teaching Hospital, Calabar, Nigeria. The study was a retrospective descriptive study that utilized data retrieved from the antenatal ward admission register, case files, theatre records and ward reports of 243 women who were managed for PROM over a 5year period at the University of Calabar Teaching Hospital (UCTH). The data collected was entered into an excel sheet and statistical analysis carried out using STATA 16. There were 9,227 deliveries and 243 cases of PROM giving a prevalence of 2.63% (95% CI 2.32- 2.98%). Many of the women were in the 26 - 30 and 31 - 35years age groups 75(30%) and 68(28%) respectively. The majority of the PROM occurred at gestational age of 37-39 weeks 102(42%). Highest risk factor was Previous history of PROM (36.2%) while 51(20.9%) of patients had no identifiable risk factor. Birth asphyxia was found in 44(18.0%) of babies and Chorioamnionitis in 38(15.4%) of the mothers and there were 32(13.0%) perinatal deaths. PROM constitutes a serious complication of pregnancy requiring proactive antenatal care in mothers at risk and vigilant care in affected mothers to reduce neonatal morbidity and mortality.

Keywords: Prelabour rupture of membranes, Gestational age, Risk factors, Complications

INTRODUCTION

Prelabour rupture of membranes (PROM) is defined as the spontaneous rupture of the fetal membranes prior to onset of labour.[1] It may occur after 37 weeks of gestation (term premature rupture of membranes (TPROM)) or before 37 weeks of gestation (preterm premature rupture of membranes (PPROM)). The incidence of PROM generally affects between 5 and 15% of all pregnancies worldwide with a relatively higher incidence in Africa.[2] For several years, PROM has been the subject of several clinical and epidemiologic studies and is considered one of the great obstetrical syndromes responsible for spontaneous preterm birth and its related complications such as Respiratory distress syndrome, intraventricular haemorrhage, and Necrotizing enterocolitis with associated high perinatal mortality rates. Up to 50% of preterm births and 80% of maternal clinical and subclinical infections have been associated with PROM worldwide with a fourfold increased risk of fetal mortality.[3] Although the exact aetiology of PROM is poorly understood, several maternal risk factors have been implicated. These include previous history of PROM, bacterial vaginosis, cervical incompetence, uterine over-distension, prior cervical surgery (eg: conization), poor nutrition and poor socio-economic status, connective tissue disorders e.g. Ehler's-Danlos Syndrome among others.[4]

Management of PROM has long been controversial. For cases of PROM remote from term, expectant management has been of great value in the improvement of perinatal survival, and in the developed world, efforts have been made to either replace the lost amniotic fluid (amnio infusion), or to seal off the site of rupture (amnioseal), sometimes with commendable results.[5,6] In our environment where it is very difficult for extra uterine survival of fetuses less than 28 weeks, PROM occurring before 34 weeks gestation are usually managed conservatively, usually with antibiotics, steroid therapy, in addition to bed rest and fetal monitoring.[7] The above measures have occasionally improved

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neonatal outcomes. However, the management of PROM at term is controversial. Evidences supports the stimulation of labour, as opposed to expectant management, to decrease the risk of Chorioamnionitis without increasing the caesarean delivery rate.[8] In the study by Hannah et al it was found that stimulation of labour and expectant management resulted in similar rates of Caesarean delivery and neonatal infection in women with PROM at term.[8] They also showed that the stimulation of labour with Oxytocin resulted in a lower risk of maternal infection such as Endometritis when compared with expectant management.[8,9] At term, infection remains the most serious complication associated with PROM for the mother and baby. The risk of Chorioamnionitis with term PROM has been reported to be less than 10% but increases to 40% after 24hours of PROM.[10]Prediction and prevention of PROM would offer the best opportunity to prevent its complications.[11]

The aim of this study was to determine the prevalence, risk factors and complications of PROM in women accessing maternity care at the University of Calabar Teaching Hospital (UCTH), Calabar, Nigeria.

MATERIALS AND METHODS

This was a retrospective descriptive study of cases of PROM managed at University of Calabar Teaching Hospital (UCTH over a 5-year period from January1st, 2015 to December 31st, 2019. The inclusion criteria were records of pregnant women with spontaneous rupture of fetal membranes, a gestational age above 28 completed weeks and that labour must not have started within one hour following spontaneous membrane rupture. Exclusion criteria included all cases of artificial rupture of fetal membranes and all pregnant women with history of PROM at gestational age below 28weeks. Data was retrieved from the triage and antenatal ward admission registers, case files of patients, theatre records and ward reports. The data collected were entered into an Excel sheet, which was imported to STATA 16 for analysis. Descriptive analysis was carried out using frequency and proportion for the categorical data while the mean or median with standard deviation or interquartile range were obtained and tabulated for parametric and non-parametric continuous variables respectively. Cross-tabulations were generated to show the relationship between the sociodemographic/ reproductive variables. Pearson's Chi square was used to test for statistical significance at P value < 0.05.

Ethical clearance was obtained from the Health Research and Ethics committee of the hospital.

RESULTS

During the study period, there were 9,227 deliveries and 243 were cases of PROM, giving a prevalence of 2.63% (95% CI 2.32- 2.98%). Many of the women were in the age group of 25-29 accounting for 84(34.8%) with the mean age of 29.36 while para 0 and 1 were commonest accounting for 85(35.0%) and 69(28.5%) respectively as shown in Table 1. The majority of the PROM occurred at the GA of 37-39 weeks 102(42%) and 34 -36weeks 74(30.4%). (Figure 1) The commonest risk factor for PROM was previous history of PROM 88(36.2%), while 51(20.9%) of the patients had no identifiable risk factors. Many of the women had vaginal delivery 148(60.8%). Antibiotics was used in 147(60.5%) of the women while 37(47.4%) of eligible women had Corticosteroids. The commonest maternal complication was Chorioamnionitis 38(15.6%) and there was no maternal death. (Table 2)

A total of 68(27.6%) of the babies had jaundice, birth asphyxia was found in 44(18.0%) and neonatal sepsis in 26(10.5%). Stillbirths and early neonatal deaths were 12(2.9%) and 20(8.1%). (Figure 2). Table 3 shows the relationship between age, parity and latency period (duration from PROM to delivery) and the gestational age, Latency period was longer in the preterm PROM and this was statistically significant.

The relationship between complications of PROM and the gestational age, also shows that complications were more in the preterm PROM and this was also statistically significant. (Table 4).

Table 1: Age and parity of patients at presentation with PROM

Variable	Frequency(N=172)	Percentage (%)
Age(years)		
<20	7	2.9
20 - 24	23	9.3
25 - 29	84	34.8
30 - 34	78	32.0
35 - 39	41	16.9
≥40	10	4.1
Mean age:		
Parity		
0	85	35.0
1	69	28.5
2	41	16.9
3	31	12.7
4	11	4.6
>4	6	2.3
Median parity: 1(0-2)		

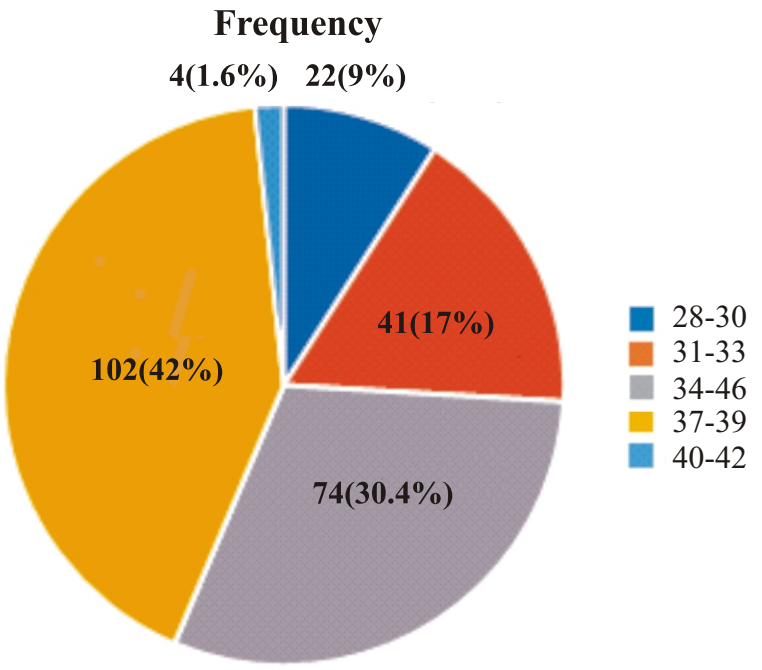

Figure 1: Gestational Age (Weeks) at presentation with PROM

Table 2: Obstetric factors and intervention

Variable	Frequency(N=172)	Percentage (%)
Risk factor for PROM		
Previous history of PROM	88	36.2
Coitus	32	13.0
Urinary tract infection	21	8.6
Vaginal discharge	19	7.8
Fever	12	4.9
Cervical incompetence	10	4.1
Polyhydramnios	8	3.9
Smoking	2	0.8
No identifiable risk	51	20.9
Latency period* (Days)		
≤1	58	36.7
>1 ≤ 3	68	43.0
>3 ≤ 5	21	13.3
> 5 ≤ 7	7	4.4
> 7	4	2.6
Median (IQR): 1.5 (0.9 – 3)		
Mode of Delivery		
Vaginal delivery	148	60.8
Caesarean section	95	39.2
Antibiotics use		
Yes	147	60.5
No	96	39.5
Corticosteroid use (≤34 weeks)		
Yes	37	47.4
No	23	29.5
Not applicable	18	23.0

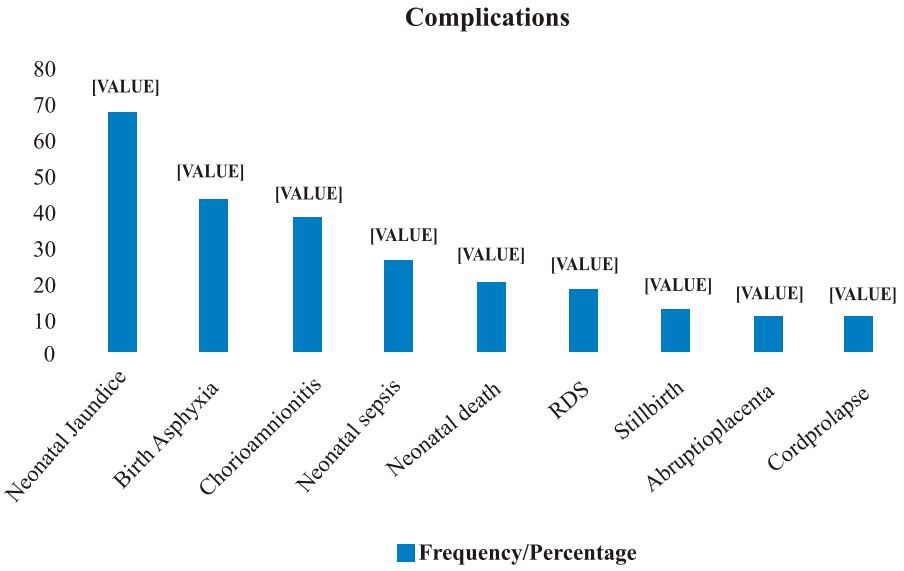

Figure 2: Complications of PROM

Table 3: Relationship between sociodemographic parameters, latency period (time from rupture to delivery) of patients with PROM in relation to Gestational Age(in weeks)

Variable	28-30	31-33	34-36	37-39	≥40	Total	Test	p-value
Age(years)								
<20	0(0.00)	3(42.86)	0(0.00)	4(57.14)	0(0.00)	7(100.00)	16.857	0.662
20-24	1(5.56)	6(27.78)	5(22.22)	9(38.89)	1(5.56)	22(100.0)		
25-29	8(9.64)	16(19.28)	29(34.90)	29(34.90)	1(1.20)	84(100.0)		
30-34	9(10.91)	11(14.55)	26(32.73)	31(40.00)	1(1.82)	78(100.0)		
35-39	8(19.35)	3(6.45)	9(22.58)	20(48.39)	1(3.23)	41(100.0)		
≥40	3(30.00)	0(0.00)	3(30.00)	4(40.00)	0(0.00)	10(100.0)		
Mean (±SD): 30.36 ± 5.13								
Parity								
0	5(5.88)	14(16.47)	24(28.23)	38(44.71)	4(4.71)	85(100.0)	10.513	0.571
1-2	16(14.55)	20(18.18)	31(28.18)	43(39.09)	0(0.00)	110(100.0		
3-4	7(16.68)	5(11.91)	15(35.71)	15(35.71)	0(0.00)	42(100.0)		
>4	1(16.67)	1(16.67)	2(33.33)	2(33.33)	0(0.00)	6(100.00)		
Median (IQR): 1(0-2)								
Latency period* (Days)								
≤ 1	2(3.45)	7(12.07)	13(22.41)	34(58.62)	2(3.45)	58(100.00	31.195	0.013*
>1 ≤ 3	1(2.08)	10(14.58)	23(33.33)	33(47.92)	1(2.08)	68(100.00		
>3 ≤ 5	7(33.33)	6(28.57)	5(23.81)	3(14.29)	0(0.00)	21(100.00		
> 5 ≤ 7	3(42.85)	1(14.29)	2(40.00)	0(0.00)	1(14.29)	7(100.00)		
> 7	2(50.00)	1(25.00)	1(25.00)	0(0.00)	0(0.00)	4(100.00		
Median (IQR):1.5 (0.9-3)								

SD: standard deviation IQR: interquartile range *statistically significant P-value Test: Pearson's Chi^2
*Latency period (Duration of rupture of membranes to delivery).

Table 4: Relationship between feto-maternal complications of patients with PROM in relation to Gestational Age (in weeks)

Complications	28-30	31-33	34-36	37-39	≥40	Total	Test	p-value
Abruptio								
Yes	3(30.00)	3(30.00)	2(20.00)	2(20.00)	0(0.00)	10(100.00)	5.57	0.234
No	19(8.15)	38(16.31)	72(30.90)	100(42.92)	4(1.72)	233(100.00)		
Chorioamnionitis								
Yes	10(26.32)	13(34.21)	6(15.79)	7(18.43)	2(5.26)	38(100.00)	22.779	<0.001*
No	12(5.85)	28(13.66)	68(33.17)	95(46.34)	2(0.98)	205(100.00)		
Cord prolapse								
Yes	4(40.00)	2(20.00)	2(20.00)	2(20.00)	0(0.00)	10(100.00)	9.348	0.053
No	18(7.72)	39(16.74)	62(26.61)	100(42.92)	4(1.72)	233(100.00)		
Still birth								
Yes	6(50.00)	2(16.67)	2(16.67)	1(8.33)	1(8.33)	12(100.00)	16.380	0.003*
No	16(6.93)	39(16.88)	72(31.17)	101(43.72)	3(1.30)	231(100.00)		
Birth asphyxia								
Yes	12(27.27)	10(22.73)	9(20.45)	10(22.73)	1(2.27)	44(100.00)	20.106	<0.001*
No	10(5.02)	31(15.58)	65(32.66)	92(46.23)	3(1.51)	199(100.00)		
NNS								
Yes	5(19.23)	7(26.92)	6(23.08)	27(26.92)	1(3.85)	26(100.00)	8.272	0.082
No	17(7.83)	34(15.67)	68(31.34)	95(43.78)	3(1.38)	217(100.00)		
NNJ								
Yes	11(16.18)	21(30.88)	25(36.76)	9(13.24)	2(2.94)	68(100.00)	41.415	<0.001*
No	11(6.29)	20(11.43)	49(28.00)	93(53.14)	2(1.14)	175(100.00)		
RDS								
Yes	9(50.00)	5(27.78)	3(16.67)	1(5.55)	0(0.00)	18(100.00)	34.645	<0.001*
No	13(5.78)	36(16.00)	71(35.56)	101(44.89)	4(1.78)	225(100.00)		
NND								
Yes	9(45.00)	4(20.00)	3(15.00)	3(15.00)	1(5.00)	20(100.00)	37.882	<0.001*
No	13(5.83)	37(16.59)	71(31.84)	99(44.39)	3(1.34)	223(100.00)		

* Statistically significant P-values

DISCUSSION

As shown from the study prelabour rupture of membranes accounted for 2.6% of the total delivery in the period under review. This is slightly higher than the quoted prevalence in some other centres,[1,12] but lower than the 5.5% and 3.1% reported by Sirak and Mesfin[12] and Okeke *et al*.[13]

A previous study done at the same center seven years ago gave a prevalence of 1.94%.[14] This study showed a peak prevalence for the reproductive age group of 24 - 29 years (66.8%) which agrees with some other studies.[11,12,13] Stuart et al, reported that the incidence of PROM rose with advancing maternal age,[15] however, this study was not in agreement with that observation. The reason for this may be that this is the age group most women are at peak of their reproductive carrier resulting in higher rates of pregnancy and PROM.[14]

The study also showed that the greatest risk factor for PROM was a previous history of PROM in 36.2% of cases. This agreed with some studies including the previous study in same center.[11,14,16]

History of coitus preceding PROM was seen in 13.0% of cases in our study, this was also noted in the previous study in this center where it was 16.0%[14] and in the study by Ekwo et al.[17] The study by Ekwo et al revealed that coital position influences the rate of PROM with missionary position during coitus in pregnancy more likely to result in PROM.[17] Coitus was not found to be a significant risk factor for PROM in a study by Assefu et al in Ethiopia.[11]

No risk factor was identified in 20.9% of cases in this study which is similar with other studies.[14,15] Our study found that 42.0% of the study population presented with term PROM compared to other studies where term PROM accounted for more than 50%.[10,14]The reason for this finding may be because as pregnancy progresses, the physical stress tolerated by the membranes decreases due to decrease in the relative concentration of collagen resulting in membrane weakness and so more PROM occurring at term.[18]

Infection was the most important maternal complication of PROM with Chorioamnionitis seen in 16% of the studied population. A similar observation was noted by other studies.[13,15,19]The reason for this finding could be that a significant number of the patients presented with prolonged PROM and might have had multiple digital vaginal examinations before presentation to the hospital.[14] In the studies by Okeke *et al.* and Medina & Hill, it was also shown that incidence of Chorioamnionitis increases with increased latency period of more than 24hours.[13,19] In our study Chorioamnionitis was significantly associated with the gestational age (GA) at which PROM occurs, We also found that duration of rupture of membranes was significantly affected by GA with preterm PROM having longer latency periods, this could be because in the management of preterm PROM, delay is usually necessary to administer Corticosteroids for 48hours to help with fetal lung maturation. It is believed that Corticosteroids can reduce many neonatal complications particularly Respiratory distress syndrome[19,20] Harding *et al.* demonstrated that use of corticosteroid in preterm PROM before 34 weeks gestation reduces perinatal morbidity and mortality.[21]Forty seven percent of eligible women (<34 weeks GA) had Corticosteroids in our study, 23% were not given because they presented with complications of Abruptio placenta and Cord prolapse and had to be delivered urgently. Abruptio placenta and Cord prolapse are recognized complications of PROM and occurred in our study but did not show statistical significance in relation to GA.[22]Antibiotics were received by 60.5% of the women in our study. Previous studies by Egarter *et al.* and Okeke *et al.* reported that the use of prophylactic antibiotics in PPROM and PROM reduces maternal morbidity.[23,13]

In this study, neonatal complications had an inverse association with GA and this was statistically significant, except for neonatal sepsis which though still higher in preterm PROM did not show statistical significance. Neonatal jaundice, birth asphyxia and Neonatal sepsis were shown to be the most frequent complications in the

babies and their frequencies were lower than those reported in a study done in Maiduguri, Nigeria.[21] Perinatal mortality in this study was 13% which was lower than the 18% quoted by Caughey and colleagues, but higher than the 8.9% by Okeke *et al.*[16,13]

Ismail and Lahiriin their analysis showed an association between longer time periods from membrane rupture to delivery and a higher incidence of neonatal infection.[10]

CONCLUSION

The prevalence of PROM in the study population was low, but similar to that obtained in other centres in Nigeria. The majority of affected mothers had previous history with resultant maternal complications. Over half of the infants delivered by affected mothers suffered neonatal complications with a few resulting in perinatal mortality.

PROM constitutes a serious complication of pregnancy requiring proactive antenatal care in mothers at risk and vigilant care in affected mothers to reduce neonatal morbidity and mortality.

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