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Prevalence of Preterm Prelabour Rupture of Fetal Membranes and Neonatal Outcome at the Gambian Tertiary Hospital

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Abstract

Preterm prelabour rupture of membranes (PPROM) is one of the major factors that have been found to correlate with adverse pregnancy outcome. It remains a critically important clinical and public health problem. PPROM occurs in 1-3% of pregnancies and causes around 25-30% of all preterm deliveries and is the leading identifiable cause of preterm deliveries. The knowledge of prevalence and neonatal outcome in our setting may certainly inform practice.

***Methodology:** A cross sectional descriptive study was conducted at Edward Francis Small Teaching Hospital (EFSTH) Banjul from January 1st 2015 to December 31st 2017. All pregnant women admitted on the labour ward with spontaneous rupture of fetal membranes before 37 completed weeks of gestation were included. Data was collected from the registers and entered into SPSS version 20. The results were expressed in descriptive statistics by simple percentage and test of significance was by Chi-square with error margin set at 0.05 and confidence interval of 95%.*

***Results:** There were 5835 deliveries recorded from January 2015 to December 2017. Seventy eight (78) were cases of preterm PROM. This showed a prevalence of 1.3% for PPROM. PPROM was more common among age group 26-30 years (mean of 28 years); multigravida (75.0%); gestation age 29-32 weeks (51.7%); housewives (51.7%). Majority (58.3%) had a latency period of 72hours and above. Vaginal birth occurred in 83.3% and 16.7% had caesarean section. The stillbirth rate was 8.3% and live birth rate was 91.7%. There was no significant difference (p-0.563) between 29-32 and 33-36 weeks in neonatal survival and Apgar score at 5 minutes.*

***Conclusions:** The study suggests prevalence of PPROM of 1.3% in our setting. The most common risk factor was multigravidity. Neonatal survival did not show any difference in gestation from 29 to 36 weeks.*

Keywords: *preterm, rupture, membranes, neonatal, outcome*

Introduction

Prelabour rupture of membranes (PROM) is the rupture of the fetal membranes before the onset of labour [1].When it occurs at a gestational age below 37 completed weeks of gestation it is called preterm prelabour rupture of membranes (PPROM). PPROM occurs in 1-3% of pregnancies and causes around 25-30% of all preterm deliveries and is the leading identifiable cause of preterm deliveries[1, 2]. There is no evidence that incidence of preterm birth is declining. In fact, the rate appears to be steadily increasing in part due to an increasing incidence of high order pregnancy [2].

A retrospective observational study conducted at the University of Nigeria Teaching Hospital Enugu, Nigeria over a 10-year period (January 1994 – December 2003)of 344 patients with PPROM, the prevalence was 25 per 1,000 births(2.5%) which was still in the global range [1, 2].

PPROM is the strongest predictor of preterm delivery but degree, sensitivity and specificity of that prediction has been a challenging issue [3]. Preterm prelabour rupture of membranes has been described as a complex auto-toxic condition and its pathogenesis involves the activation and interaction of the cytokines, matrix metalloproteinase and the apoptosis pathways. Genetic variation, behavioural and environmental risk factors can add complexities to understanding these pathways. A combination of factors, short cervix, previous preterm delivery due to PPROM, and presence of fetal fibronectin seem to be the strongest predictors of PPROM at less than 35weeks gestation [3].

Intra amniotic infection as indicated by elevated cytokine levels in vaginal fluids also seems to predict PPROM with good sensitivity and modest specificity. Interventional studies to prevent PPROM have largely been unsuccessful; specifically antibiotic trials in women with bacterial vaginosis have not yielded satisfactory results [3].

Reaching a diagnosis depends on the clinical presentation and pooling of liquor at the posterior fornix during sterile speculum examination. Most often diagnosis is achieved by history and speculum examination however, when pooling of liquor is not seen and valsaval manoeuvre did not demonstrate jet of fluid from the external cervical ostium then ultrasound assessment of liquor volume and high vaginal swab for PH, ferning and free fetal fibronectin tests may be helpful in reaching a diagnosis of membranes rupture [4, 5].

PPROM is associated with lower latency period from membranes rupture until delivery, an increase risk of chorioamnionitis and umbilical cord complication. Hence it is an important cause of perinatal morbidity and mortality [6, 7, 8].

Neonatal outcomes following preterm prelabour rupture of membranes vary depending on gestational age and latency period. Most of the neonatal morbidity and mortality is a result of prematurity [8].Scholars working elsewhere have reported adverse perinatal outcome following preterm delivery to be up to 70% of perinatal mortality worldwide [9]. A survey in the USA accessing preterm prelabour rupture of membranes: risk of recurrence and complications in the next pregnancy among a population-based sample of gravid women found that the rates of recurrent preterm prelabour rupture of membranes was (16.7%) and preterm delivery (32.2%). The study concluded that risk for recurrent PPROM is increased by 20- fold and for recurrent preterm delivery is almost 4- fold [10].

This is one obstetrics complication where treatment does not depend on cause as the aetiology of PPROM is multifactorial. However, available evidence strongly supports management considerations to include antibiotics, corticosteroids, and tocolytics [11].

The obstetrics complications following fetal membranes rupture are well established more so, consequences of prematurity. Therefore, knowledge of prevalence, neonatal outcome and relationship between PPROM with maternal age and parity may certainly inform practice and add value in the management of this condition in our setting

Methodology

A cross sectional descriptive study was conducted at Edward Francis Small Teaching Hospital (EFSTH) Banjul from January 1st 2015 to December 31st 2017.

Study Location

EFSTH is located in Banjul, the capital of the Gambia. It is the only teaching hospital and a tertiary referral centre.

Study Population

all pregnant women admitted on the labour ward during the period under review.

Sample Size

were all-inclusive and those with PPROM were analysed further.

Inclusion Criteria

The patient has ruptured fetal membranes spontaneously and the gestational age below 37 completed weeks. Labour did not start within 1 hour following spontaneous membranes rupture.

Exclusion Criteria

All cases of artificial rupture of fetal membranes were excluded from the study. Incomplete records, twin pregnancy, and any co-morbidity with PPROM were excluded.

The outcome variables were total number of women diagnosed of PPROM and maternities in the period under review. Other variables include socio-demographic characteristics, parity, gestational age, history of previous PROM, duration of hospital stay, duration of PROM to delivery, mode of delivery, onset of labour, Apgar scores at 5 minutes, live birth, stillbirth and perinatal mortality.

Data Collection and Statistical Analysis

The main source of information was from patient folders which were retrieved from the medical records. A data collection tool was in four parts; socio-demographic characteristics, obstetrics history, maternal and fetal outcome. The data was entered into statistical package for social science version 20 (SPSS-20) and analysed by descriptive statistics. The results were expressed in tables and graphs. Test of significance was at p-value of 0.05 with confidence interval of 95%.

Ethical Considerations

Ethical clearance was obtained from the Research and Publication Committee of the School of Medicine and Allied Health Sciences, University of The Gambia. Consistent check was used during data entering and patient's identifiable information was coded.

Results

In the period under review, 5835 deliveries were recorded. There were 78 cases of preterm prelabour rupture of membranes.

This showed a prevalence rate of 1.3% for preterm prelabour rupture of membranes of all deliveries. Eighteen folders had no tangible information for further analysis therefore, was removed during the analysis. It was not clear in the notes whether or not they received Erythromycin 250mg 6hourly and corticosteroids. Therefore, those folders were removed from further analysis as neonatal outcome was one of the key primary outcome measure.

Table1. *Socio-demographic characteristics*

Maternal Age	N=60	(%)
16 – 20	6	10.0
21 – 25	12	20.0
26 – 30	24	40.0
31 – 35	12	20.0
36 – 40	4	6.7
41 – 45	2	3.3
	60	100
Marital Status		
Single	3	3.9
Married	45	80.5
Widowed	1	1.7
Not Recorded	11	18.3
	60	100
Occupation		
Housewife	31	51.7
Business women	8	13.3
Teachers	1	1.7
Students	1	1.7
Not Recorded	19	31.6
	60	100

Table 1: Socio-Demographic Characteristics of Women with PPROM

PPROM was highest in the reproductive age group of 26-30 years (40.0%) and lowest in the age group of 41-45 (3.3%) with a mean age of 28.1 years (S.D 1.2) and the mode being 28 years. Majority were married and housewives, with proportions of 75.0%, and51.7% respectively.

Obstetrics characteristics of women with PPROM: (fig 1, 2) and table 2

The obstetric profile of women with PPROM shows that Multigravida had the highest frequency of PPROM (75.0%). Multiparous women with a range of 1-5 accounts for 58.3%; PPROM was more frequent in patients with gestational age between 29–32 weeks (51.7%) Ninety percent (90.0%) of them had antenatal care, 1.7% did not and 8.3% was not recorded.

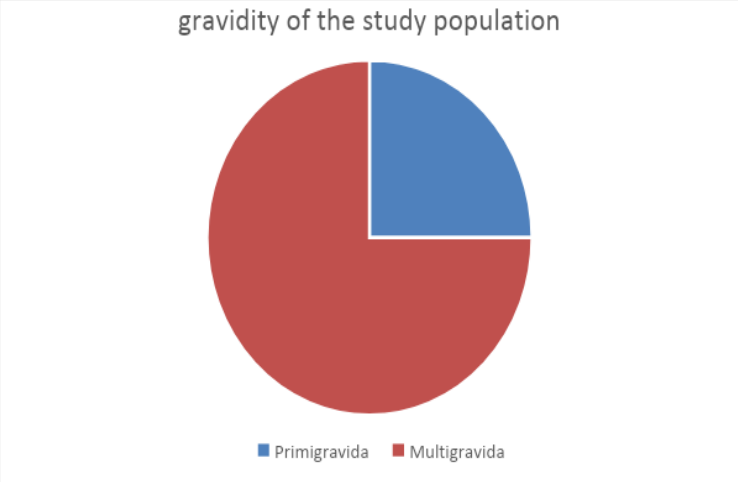

Fig1. *gravidity of the study population*

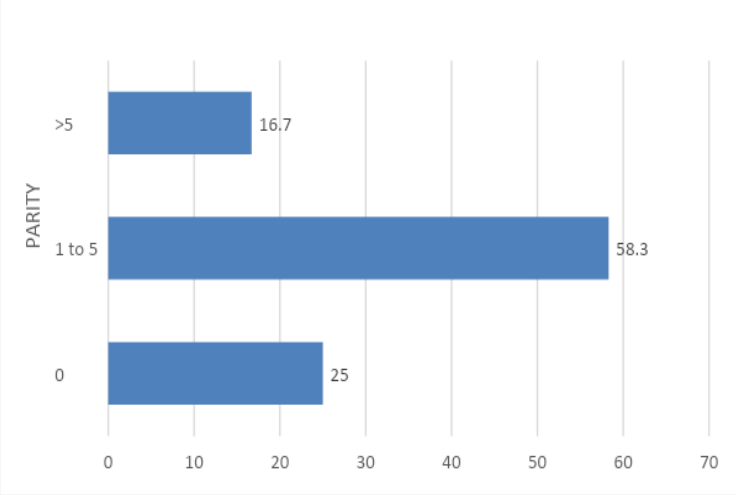

Fig2. *Distribution of cases according to parity*

Table2. *distribution of antenatal care and gestational age*

Antenatal care	N=60	(%)
Yes	54	90.0
No	1	1.7
Unrecorded	5	8.3
Total	60	100
Gestation age (weeks)		
29 – 32	31	51.7
33 – 36	29	48.3
Total	60	100

Management Outcome of Women with PPROM

Table 3: feto-maternal outcome

The women with highest duration of hospital stay were 41.7% (25/60) with a range of 3-7days. Latency period from PPROM to onset of labour was 58.3% (35/60) in >72hours. Labour started spontaneously in 71.7% (43/60) of the mothers. Pregnancy was terminated by induction in 15.0% (9/60) and caesarean section before onset of labour in 13.3% (8/60). Emergency caesarean section was performed in 3.4% (2/60). Liquor colour was clear in 58.3% (35/60) and no case of meconium stained. Mode of delivery showed vaginal birth rate in the study group was 83.3% (50/60) and caesarean section was 16.7% (10/60). There was no maternal complication in 96.7% (58/60) of mothers, however, 1.7% (1/60) had wound site infection and the other 1.7% (1/60) had post-partum haemorrhage secondary to cervical tear.

Table3. *Feto-maternal outcome*

Duration of hospital stay	N=60	(%)
<3 days	22	36.7
3 -7 days	25	41.7
>7 days	13	21.6
Total	60	100
Onset of labour		
Spontaneous	43	71.7
Induced	9	15.0
Elective C/S	8	13.3
Total	60	100
Mode of delivery		
Vaginal birth	50	83.3
Caesarean section birth	10	16.7
Total	60	100
Colour of liquor		
Clear	35	58.3
Meconium stained	0	0
Not recorded	25	41.7
	60	100
Maternal complication		
No complication	58	96.7
Wound site infection	1	1.7
Haemorrhage	1	1.7
	60	100
Baby's birth weight		
≤2.5	46	76.7
>2.5	14	23.3
Apgar score at 5minutes		
≤7	10	16.7
>7	50	83.3
Fetal survival		
Alive	55	91.7
Stillbirth	5	8.3

Table 4: shows the relationship of Gestation age, Apgar score at 5 minutes andfetal survival

Twenty eight (28) babies delivered between 29-32 weeks were livebirths. Similarly, twenty seven (27) babies delivered between 33-36 weeks were livebirths. Three stillbirths occurred in those with GA between 29 and 32 weeks, and 2 stillbirths occurred in those with GA between 33 and 36 weeks. There was no significant difference(p-0.563) between 29-32 and 33-36 weeks in neonatal survival and Apgarscore at 5 minutes.

Table4. *shows the relationship of the GA, neonatal survival and Apgar score*

	Livebirths	Stillbirths	N	p-value	Apgar score <7 at 5 min <7	Apgar score 7/> at 5 mins >7	n	p-value
29-32 GA	28	3	31		6	25	31	
33-36 GA	27	2	29		4	25	29	
Total	55	5	60	0.563	10	50	60	0.563

Discussion

Preterm PROM, occurring globally in 1%–3% of all pregnancies, is associated with significant maternal, fetal and neonatal risks [12].The prevalence of 1.3% of PPROM in this study is generally in the global range. It is significantly similar to reported prevalence in England (1%) [13], United States (1-2%) [14], Canada (2-3%) [15], Brazil (3.1%) [16] and Ethiopia (1.4%) [12]. However, the prevalence in our practice is lower than reported prevalence from most developing countries including that of Nigeria, India, Pakistan and Uganda with reported prevalence of 3.3%, 7.72%, 9.6% and 12.1% respectively [17, 18, 19, 20]. Although it was higher than the prevalence of 0.9% and 0.11% in the study conducted at Addis Abba and Saudi Arabia [21, 22].

Our study showed that the peak incidence of PPROM was in the reproductive age group of 26-30 years (40.0%) and lowest in the age group of 41-45 (3.3%) with a mean age of 28.1 years (S.D 1.2) which was comparable with that of Okete et al [23]where the peak incidence of maternal age was 26-30 (43.0%). Similarly, in Ethiopia, 25-29 (33.3%) [12] and Indian 21-25 (41%) [24], were invariably comparable with the findings in our study.

This study reviewed that 62 (75%) of women with PPROM were married and 31 (51.7%) were housewives. This was also comparable with studies conducted elsewhere [12].

The relationship of obstetric profile of women with PPROM in this study showed that Multigravida had the highest frequency of PPROM (75.0%) which is similar to a study conducted in Enugu, Nigeria by Okete et al and in Pakistan by Saira Dars et al wheremultigravida accounted for (67.15% and 83%) respectively [23, 25]. However, different from studies conducted by Jameela et al [24] and Vlora et al [26] were primigravida had the highest incidence of 63.12% and 54.8% respectively. In this study, multiparous women were (75%) with a highest range of 1-5 and nulliparous were 25% which was comparable with studies conducted elsewhere [22, 23]. However, some other studies showed a predominance of nulliparous [27, 28, 12]. The disparity in the findings of these studies is observed but the reason cannot easily be justified. However, the trend of PPROM seems to be higher in mothers who have had more pregnancy and childbirth than those in their first pregnancy suggesting a research interest in the future.

The distribution of gestation age in this study population shows 29–32 weeks 31(51.7%) with a mean of 32.4weeks was associated with more PPROM. However, when compared with other studies the gestation age of highest frequency was between 32-36 weeks [12, 23, 25, 29, 30].This suggest that in our setting PPROM occur at much lower gestation age.

The highest duration of hospital stay in this study shows 41.7% with the range of 3-7days. Compared to Shweta et al [31] and Vlora et al [26] that showed 0.5-40 days and 9.3 days respectively.

Latency period from PPROM to onset of labour was 8.3% in >24hours, 33.4% in 24-72hours and 58.3% in >72hours.Compared to other studies, the mean latency period from PROM to onset of labour was 6.6 days with a median of 3.0 and range of 1-65 days [12]. Also, in a study conducted by Saira Dars et al[25], out of 100 mothers 26 had PROM of <24 hrs duration and 74 had >24 hrs of duration.

There is currently no effective way of preventing most preterm PROM as it is mostly unpredictable. However, its early and accurate diagnosis would allow for gestational age–specific obstetric interventions designed to optimize maternal and perinatal outcome, and minimize serious complications. It is therefore important that all pregnant women be well informed regarding maternal, fetal and neonatal complications, and the need to immediately seek medical care when it occurs [12]. In our study; nearly all the study mothers (90.0%) had antenatal booking (ANC) with regular follow-up, only 1.7% did not have. This finding is much different from Shweta et al where patients who

booked and unbooked for ANC were 16% and 84% respectively. This could be due to the fact that Shweta et al considered cases as booked if the patients had 3 antenatal check-ups of which at least one in third trimester.

In this study 71.7% developed spontaneous labour, 15.0% needed induction and 13.3% was delivered by C/S before labour. This is comparable to a study reported in TAH Addis Ababa, Ethiopia where labour started spontaneously in 58.5% of the mothers, terminated by induction in 30.6% and C/S before onset of labour in 10.8% [12]. PPROM is usually followed by labour. The onset of labour after PPROM is directly related to the gestational age at the time of rupture. As we had majority in the low gestation age (29-32 weeks) and had 72% spontaneous labour suggests that lower gestation age may be more likely than not to follow spontaneous labour.

The mode of delivery in this study shows vaginal deliveries of 83.3%. This proportion is consistent with the UK 53% [27], Ethiopia 76.8% [12], Saudi Arabia 54.8% [22] and Pakistan 55% [25]. On the other hand caesarean section rate was 16.7% (elective and emergency) which is lower compared with a study done by Biniyam et al with caesarean section of 23.2% [12], by Albager et al with Caesarean of 41.7% [22] and Mousiolis et al caesarean section of 43.7% [32].

Regarding maternal complication among the study population, (96.7%) did not have any complication. Wound site infection (1.7%) and post-partum haemorrhage secondary to cervical tear (1.7%) were the only recorded complications. In a previous study carried out in Saudi Arabia, Maternal complications include first- degree perineal laceration (12.8%), chorioamnionitis (0.2%), postpartum haemorrhage (1.9%), abruptio-placentae (0.2%) and septicaemia (0.5%) [22].

Following membranes rupture the preterm fetus is at risk of a number of complications. The most significant risks to the fetus after preterm PROM are complications of prematurity. Similarly, the most common complication of PPROM related to perinatal outcome in this study was prematurity. Babies weighing ≤2.5 accounted for 76.7%. This was comparable with a study done by Shweta et al[3] were birth weight of ≤2.5 was 76%. A similar study in south Africa recorded (86%) for birth weight ≤2.5 [29]. The consequences of low birth weight is beyond the scope of this study, however, is a food for thought as long-term adverse effects on these babies remain largely unknown.

The fetal outcome in this study showed a single live birth of (91.7%) and stillbirth (8.3%). Five percent (5%) of the stillbirth occurred to mothers with a gestation age of 29-32 weeks and (3.3%) occurred in mothers with GA of 32-36weeks. However there was no statistical significant difference between the two groups (p-0.563). Previous studies showed a single live birth (92.5%), twin live birth (2.3%) and stillbirth (5.1%) [22]; in Noor et al, 5.8% were delivered stillbirth [19] which were comparable with the findings in our study.

Limitations

A major limitation of this study was that a significant number of files were either missing or were excluded due to a deficiency of crucial information required for the study. Also, limitation of this study was the restriction of the study population to the referral hospital with a selected group of women. In addition, it is a small scale retrospective study and it was not possible to assess some demographic factors with PPROM because of incomplete information in the medical records. A single centre study findings may not be generalized to the entire population. Despite the limitations, this study has provided baseline information on PPROM in our setup and is a stepping stone towards further research on PPROM among Gambian women.

Conclusion

The data from this study shows PPROM prevalence of (1.3%) which was in the global range of 1-3%. The most common morbidity associated with PPROM was prematurity. Most common risk factors were multigravidity, mean age of 28 years and mean gestation age of 32weeks. There was no neonatal survival advantage from 29 to 36 week of gestation.

Abbreviations

ANC -Antenatal clinic care

EFSTH –Edward Francis Small Teaching Hospital

GA-Gestation Age

PROM – Prelabour rupture of membranes

PPROM – Preterm Prelabour rupture of membranes

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The authors wish to thank Amie Jobarteh and all members of the hospital medical records for help with the patient's folders retrieval and relevant dataset for total number of pregnancies in the period under review.

Availability of Data and Materials

The datasets generated and/or analyzed during this study are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

Ethical clearance to undertake this study was sought from the Research and Publication Committee at the School of Medicine and Allied Health Sciences, University of The Gambia and approval was granted. Patient's folders were careful kept and their identifiable information was neither used nor shared. Consent to participate in the study was waived as this was a retrospective analysis of medical records.

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