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Incidence and Risk Factors of PPROM and its Maternal and Neonatal Outcomes at Different Gestational Ages

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Abstract: ***Introduction: In countries with high and low incomes, preterm premature rupture of membranes (PPROM) is a major contributor to perinatal, neonatal, and maternal morbidity and mortality. The impact of PPROM is exacerbated in developing countries as a result of various factors related to the standard of healthcare provided and socioeconomic factors. Aims & Objectives: To determine the incidence and risk factors of PPROM. We also assess the obstetric and neonatal outcomes at different gestational ages. Methodology: This was a prospective study conducted in the Department of Obstetrics and Gynecology, Bebe Nanki Mother and Child Care Centre, Guru Nanak Dev Hospital, Amritsar on the pregnant women attending the indoor or outdoor services between February 2021 and May 2022 with preterm premature rupture of membrane (PPROM). Results: Nearly 63.6%neonates had noneonatal morbidity while 36.4%had neonatalmorbidity in form of jaundice, RDS, septicemia, meningitis and hypoglycemia. Maternal outcome and Neonatal outcome at different gestational age was found to be statistically significant (p<0.05). Latency period , abnormal vaginal discharge, history of PROM etc. were found to be significant maternal risk factors on statistical analysis (p<0.05). Conclusion: Based on the findings of the present study, we conclude that abnormal vaginal discharge, vaginal bleeding, previous premature rupture of membrane etc. were associated with preterm premature rupture of membrane. Thus, early screening and treatment of urinary tract infections and abnormal vaginal discharges were recommended to reduce the risk of preterm premature rupture of membrane.***

Keywords: Culture and sensitivity, neonatal outcome, chorioamniotis, maternal risk factors, CRP

1. Introduction

Prelabor rupture of membranes (PROM), or the rupture of membranes before the onset of labor and before 37 weeks of gestation, occurs in 2–3% of pregnancies. It is a severe pregnancy complication that carries risks like premature birth, infection of the mother or the baby, and respiratory distress syndrome. [1, 2] The major risk factors for PPROM include preterm prelabour rupture of membranes in a prior pregnancy, vaginal bleeding, anaemia/low BMI (Body Mass Index<19kg/m2), preterm labour, low socioeconomic status, other uteroplacental and foetal factors etc.

Most studies addressed the fact that in cases of expectant management of PPROM, combined use of antibiotics and corticosteroids appear to confer greater benefits in the reduction of adverse neonatal outcomes (e.g. respiratory distress syndrome (RDS) and intracranial hemorrhage) in the absence of maternal and fetal infectious compromise. Although concern persists over the development of resistant strains of organisms involved in neonatal sepsis, current data support the use of antibiotics in this setting.[3,4] Nor is there currently great evidence to support routine use of tocolytics in cases with PPROM; however, tocolysis for a limited period of time (48 h) after preterm amniorrhexis may justify consideration. There is paucity of data regarding incidence, risk factors and outcome of PPROM in Indian population. Hence, the present study aimed to determine the incidence and risk factors of PPROM and evaluate the obstetric and neonatal outcomes at different gestational ages. This study was being done with a view to improve the safety and outcomes in pregnant women with PPROM.

2. Material & Methods

Study design: Prospective observational study
Place of Study: Guru Nanak Dev Hospital, Amritsar
Sample size: 300pregnant women with preterm premature rupture of membrane
Sampling technique: This was a prospective, observational study
Period of study: February 2021 - May 2022

Inclusion Criteria

All the pregnant women with pregnancies <37 weeks of gestational age with premature rupture of membranes.

Exclusion Criteria:

- Multiple pregnancies.
- Intrauterine growth restriction.
- Fetal Anomalies.
- Intrauterine fetal death (IUFD).

Clinical examination included the following:

- Pulse
- Blood pressure
- Abdominal palpation to confirm presentation
- Uterine contraction
- Fetal heart

Other Investigations included the following:

- Complete Blood Count
- Platelet count
- Total Leukocyte Count
- Differential Leukocyte Count
- C Reactive Protein
- Liver Function Tests
- Renal Function Tests
- Urine culture
- Vaginal culture and sensitivity tests
- Ultrasonography

All data was tabulated and subjected to appropriate statistical analysis using SPSS version 21.0.
Ethical approval was obtained from institutional ethical committee and written consent was obtained from all patients after explaining in detail the entire research protocol.

3. Results

Descriptive

The majority of study participants (65%) were in the age group 21 to 30 years with 57.3% from the rural areas, whereas remaining 42.7% resided in the urban areas. The majority of participants in the study (60%) belonged to lower middle class, 26.7% had completed education up to middle school, followed by 19.3% participants who completed intermediate. (Table 1)

Table 1: Patient demographics

Characteristics	N (%)
Age Group (Years)	
<20	43 (14.3)
21-30	195 (65.0)
>30	62 (20.7)
Residence	
Rural	172
Urban	128
Socioeconomic Status	
Upper Class	18 (6.0)
Upper Middle	6 (2.0)
Lower Middle	180 (60.0)
Upper Lower	42 (14.0)
Lower	54 (18.0)
Educational Qualification	
Illiterate	48 (16.0)
Primary School	32 (10.7)
Middle School	80 (26.7)
High School	45 (15.0)
Intermediate	58 (19.3)
Graduate And Above	37 (12.3)

Incidence

In the present study,150 participants (50%) were between 33-37 weeks of gestation,123 participants (41%) between 28-32 weeks and 27 participants (9%) with gestational age <28 weeks.

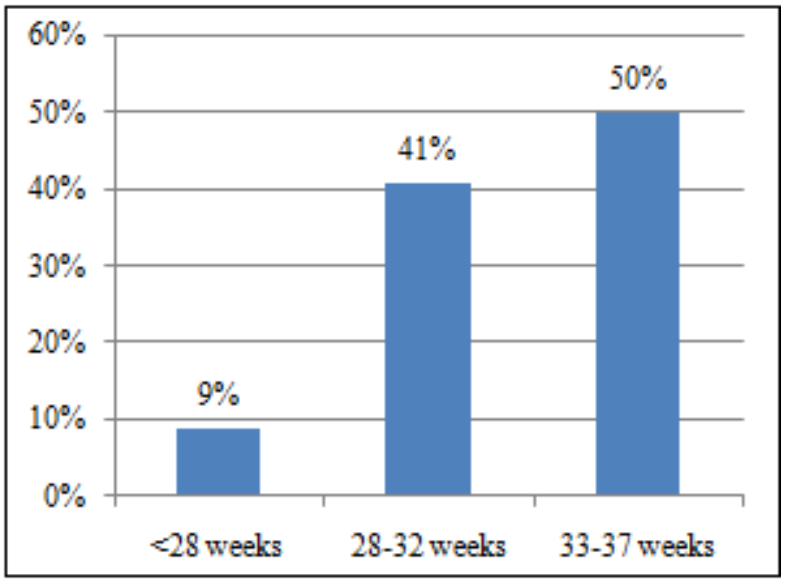


Figure 1: Distribution of study participants with PPROM at different gestational ages

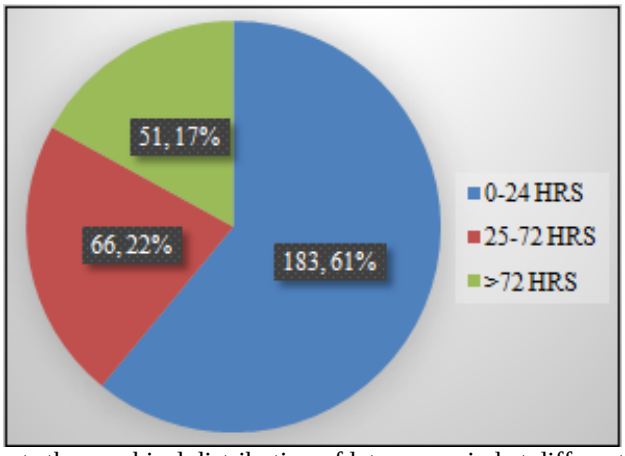


Figure 2: Represents the graphical distribution of latency period at different gestational ages.

Risk Factors

Table 2 depicts distribution of risk factors at different gestational ages. Vaginal bleeding, abnormal vaginal discharge, history of PROM, history of preterm birth, mode of delivery, hours of leakage and diabetes mellitus were found to be significant risk factors on statistical analysis ($p<0.05$).

Table 2: Risk factors of PPROM at different gestational ages

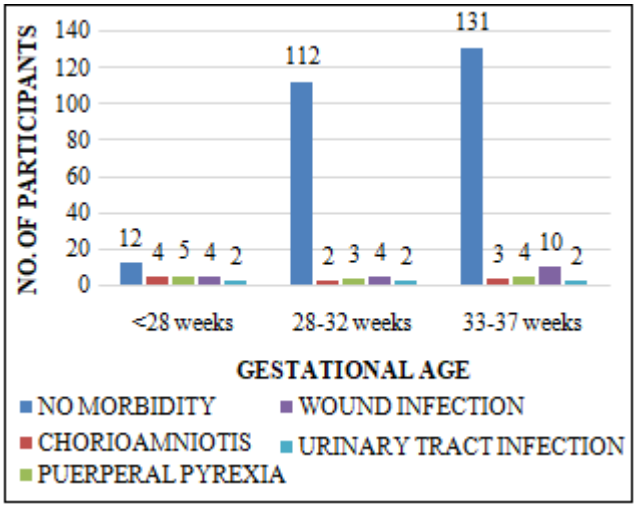
Risk Factors		Total		Gestational Age <28 Weeks (N=27)		Gestational Age 28-32 Weeks (N=123)		Gestational Age 33-37 Weeks (N=150)		P Value
		NO.	%AGE	NO.	%AGE	NO.	%AGE	NO.	%AGE	
Vaginal Bleeding	Yes	54	18.0%	18	66.7%	22	17.9%	14	9.3%	<0.00001
	No	246	82.0%	9	33.3%	101	82.1%	136	90.7%	
Abnormal Vaginal Discharge	Yes	222	74.0%	13	48.1%	99	80.5%	110	73.3%	0.0023
	No	78	26.0%	14	51.9%	24	19.5%	40	26.7%	
History of Prom	Yes	133	44.3%	20	74.1%	53	43.1%	60	40.0%	0.0043
	No	167	55.7%	7	25.9%	70	56.9%	90	60.0%	
History of UTI	Yes	33	11.0%	3	11.1%	14	11.4%	16	10.7%	0.9823
	No	267	89.0%	24	88.9%	109	88.6%	134	89.3%	
History of Preterm Birth	Yes	64	21.3%	18	66.7%	20	16.3%	26	17.3%	<0.00001
	No	236	78.7%	9	33.3%	103	83.7%	124	82.7%	
Foetal Presentation	Cephalic	252	84.0%	20	74.1%	102	82.9%	130	86.7%	0.2371
	Breech	48	16.0%	7	25.9%	21	17.1%	20	13.3%	
Hours of Leakage	<12 Hr	133	44.3%	20	74.1%	53	43.1%	60	40.0%	0.0043
	>12 Hr	167	55.7%	7	25.9%	70	56.9%	90	60.0%	
Anemia	Yes	160	53.3%	15	55.6%	75	61.0%	70	46.7%	0.0602
	No	140	46.7%	12	44.4%	48	39.0%	80	53.3%	
Diabetes Mellitus	Yes	168	56.0%	8	29.6%	70	56.9%	90	60.0%	0.005
	No	132	44.0%	19	70.4%	53	43.1%	60	40.0%	
Hypertension	Yes	34	11.3%	1	3.7%	17	13.8%	16	10.7%	0.3030
	No	266	88.7%	26	96.3%	106	86.2%	134	89.3%	

$P<0.005$ was considered significant.

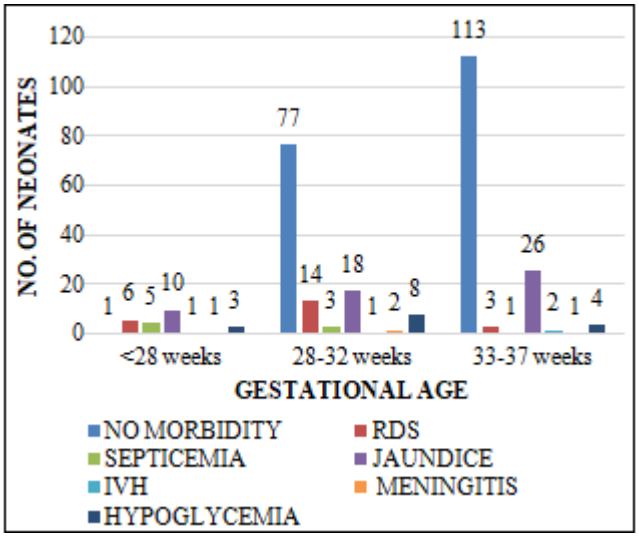
Table 3 depicts distribution of neonatal risk factors at different gestational ages. Birth weight, resuscitation and outcome were found to be significant neonatal risk factors on statistical analysis ($p<0.05$).

Table 3: Neonatal risk factors at different gestational ages

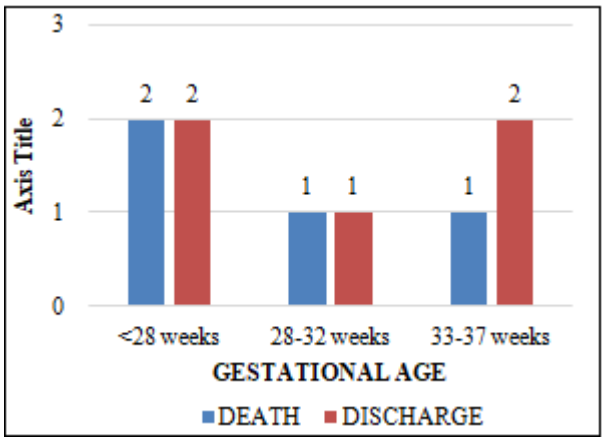
Neonatal Characteristics		Total		Gestational Age <28 Weeks (N=27)		Gestational Age 28-32 Weeks (N=123)		Gestational Age 33-37 Weeks (N=150)		P Value
		No.	%AGE	No.	%AGE	No.	%AGE	No.	%AGE	
Birth Weight (KG)	<1.5	40	13.30%	6	22.20%	12	9.70%	22	14.70%	<0.00001
	1.5-2.0	80	26.70%	3	11.10%	30	24.40%	47	31.30%	
	2.0-2.5	98	32.70%	14	51.90%	61	49.60%	23	15.30%	
	>2.5	82	27.30%	4	14.80%	20	16.30%	58	38.70%	
APGAR Score at 5 Min	<5	2	0.70%	1	3.70%	1	0.80%	0	0%	0.081
	>5	298	99.30%	26	96.30%	122	99.20%	150	100%	
Resuscitation	Yes	64	21.30%	18	66.70%	20	16.30%	26	17.30%	<0.00001
	No	236	78.70%	9	33.30%	103	83.70%	124	82.70%	
Congenital Anomaly	Yes	6	2.00%	2	7.40%	2	1.60%	2	1.30%	0.1077
	No	294	98.00%	25	92.60%	121	98.40%	148	98.70%	
Outcome	Death	14	4.70%	9	33.30%	4	3.30%	1	0.70%	<0.00001
	Discharge	286	95.30%	18	66.70%	119	96.70%	149	99.30%	



Maternal Outcomes



Neonatal Outcomes



Outcomes with chorioamnionitis

Outcomes

Figure 3 shows graphical presentation of Maternal, Neonatal outcome and outcome in patients with chorioamnionitis at different gestational age.

4. Discussion

In the present study,65% of the participants were in the age group 21 to 30 years. Surayapalem S et al. [3] observed that PROM was common in age group of 20-24 years with mean age of 22.6 years and SD of 2.8years.In our study, 57.3% of participants were from rural areas and 60% belonged to lower middle class. Dars S et al. [4] also concluded that 72% of them belonged to lower middle class. The factors leading to higher incidence of PPROM in low socio-economic status include poor hygiene, malnutrition, anaemia, stress, over exertion, high parity, recurrent genitourinary infections etc.

Latency period, vaginal bleeding, abnormal vaginal discharge, history of PROM, history of preterm birth, mode of delivery, hours of leakage and diabetes mellitus were found to be significant maternal risk factors. Kannan MP et al. [5] identified that diabetes mellitus, poor weight gain and history of previous preterm birth were the factors associated with PPROM significantly. Bouvier D et al.[6] observed that the specific risk factors for PPROM were history of PPROM, nulliparity, gestational diabetes, and low level of education. Addisu et al. [7] identified significant risk factors for PPROM were abnormal vaginal discharge, urinary tract

infection, history of premature rupture of membranes and vaginal bleeding.

In the present study, 61%patients had latency period below 24 hours and 73.3% with gestational age of 33-37 weeks had latency period <24 hours which is statistically significant. In a study by Yu Het al.[8], there was a strong inverse correlation between gestational age at PPROM and the latency period. The duration of the latency period was significantly longer among woman with PPROM before 34 weeks as observed by Test G et al. [9]

Similar to findings by Addisu D et al. [7] vaginal bleeding and previous history of PROM were found to be a significant risk factor in this study. Women who had a history of vaginal bleeding in current pregnancy were 2.58 times more likely to develop PPROM. Pregnant women who had history of PROM were 3.31 times more likely to develop PPROM. Similar to findings by Assefa NE et al. [10] a significant association was noted between abnormal vaginal discharge and PPROM. Abnormal vaginal discharge is a common symptom of genital infections. Inflammatory cells produced by genital infections are involved in weakening of the fetal membranes among pregnant women thus causing PPROM. [11]

Having gestational diabetes mellitus was found to be a significantly associated factor for preterm rupture of membrane in the present study. This is consistent with findings of Bouvier D et al.[6], and Harger JH et al.[11]. Maternal morbidity was noticed in 15% cases, which is comparable to findings of Mohokar SA et al. [12], Surayapalem S et al. [3] and Galletta MAK et al.[13]. However, in study by Pisoh DW et al.[14], only 10.53% of women who had PPROM had an unfavourable outcome.

In the present study, birth asphyxia, septicemia and respiratory distress syndrome were main causes for neonatal mortality. Kannan MP et al. [5] found birth asphyxia, low birth weight and prematurity to be significant neonatal risk factors. Neonatal morbidity was observed in 36.3% cases in this study with most common being jaundice, followed by respiratory distress syndrome, septicaemia and IVH. Neonatal outcome at different gestational age was found to be statistically significant in this study. In a similar study by Singh N et al. [15], birth asphyxia was seen in 12% of patients, jaundice in 12%, and septicemia in 4% of the subjects. The neonatal mortality rate in present study was 4.7%. Yu H et al. [8] and Mohokar SA et al. [12] reported neonatal mortality rate of 7.4% and 15% respectively. A low mortality rate of 3.3% was observed by SinghN et al. [15]

5. Conclusion

Majority of PPROM patients were with gestational age 33-37 weeks with maternal age 21-30 years in our study. Latency period, abnormal vaginal discharge, vaginal bleeding, history of prom, history of preterm birth and hours of leakage were found to be major maternal risk factors and birth weight, apgar score at 1 minute and resuscitation were the major neonatal risk factors. Hospitalisation of the study group population with PPROM contributes to increased economic burden. An appropriate and accurate diagnosis of PPROM is critical to optimize pregnancy outcome. Patient is suggested that timely diagnosis and management of PPROM will allow obstetric care provider to optimize perinatal outcome and minimize neonatal mortality.

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