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STUDY OF MATERNAL AND PERINATAL OUTCOME IN PREMATURE RUPTURE OF MEMBRANES AT TERM GESTATION IN A TERTIARY CARE HOSPITAL-GOVERNMENT MATERNITY HOSPITAL, TIRUPATI, ANDHRA PRADESH, INDIA

Dr.PS. Chandana[1], Dr G. Parthasaradhi Reddy[2], Dr K Sunitha[3], Dr B Nirmala Devi[4*], Dr. Lahari.N[5]

[1]Medical officer in ESI hospital.
[2]Professor, Department of Obstetrics and Gynaecology, Sri Venkateswera Medical College, Tirupati.
[3]Associate professor, Department of Obstetrics and Gynaecology, Sri Venkateswera Medical College, Tirupati.
[4]*Associate professor, Department of Obstetrics and Gynaecology, Sri Venkateswera Medical College, Tirupati
[5]Fellowship reproductive medicine Milan Fertility Clinic, JP Nagar, Bangalore.

ABSTRACT

BACKGROUND – The study of maternal and perinatal outcomes in premature rupture of membranes at term gestation was conducted in patients admitted to a government maternity hospital, Tirupati, Andhra Pradesh, India.

MATERIALS & METHODS-A prospective hospital-based study was undertaken with 200 cases with premature rupture of membranes (PROM) at or above 37 weeks of gestation in the Department of Obstetrics and Gynaecology, GMH, SV medical college, Tirupati from December 2020 to December 2021

RESULTS- The majority of the participants in the study were between the ages of 20 and 24 (64 %). Majority of PROM cases were found in unbooked cases (76.0 %). In the study population, primigravidas (58.0%) had a higher rate of PROM than multigravidae (42 %). The majority of the participants were from a low socioeconomic background (76 %). Most of the women were admitted within 6 hours (46%) and very few cases were admitted after 24 hours of the onset of PROM (3%). The shortest period of PROM was 1 hour and the longest period was 72 hours with a mean duration of 8.61 hours. 31% (n=62) of the study population were delivered by caesarean delivery, among them failure to progress, accounting for 48.38 % (n=30) and foetal distress in 28.03 % (n=18). Maternal morbidity was seen in 19.5% (n=39) Febrile morbidity was seen in 10% (n=20). Urinary tract infection was seen in 4% (n=8). Wound infection was seen in 2% (n=4), PPH seen in 2% (n= 4), Chorioamnionitis was seen in 1% (n=2), Puerperal sepsis in 1 %(n=2). Perinatal morbidity was seen in 24% and perinatal mortality in 0.5% of the neonates.

CONCLUSION-According to the present study of PROM, the caesarean section rate was 30.5%. Maternal morbidity was seen in 19.5%, of which febrile morbidity accounted for 10%. Perinatal morbidity was seen in 24% of the cases and the perinatal mortality rate was seen at 0.5%.

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INTRODUCTION-. PROM is characterized by the spontaneous rupture of the foetal membranes at least one hour before the onset of labour. A series of metabolic activities culminate in membrane rupture, which causes the foetal membranes to separate from the decidua in the uterus. PROM occurs in 10% of all pregnancies[1.] Prelabour rupture of membranes that occurs preterm approximately 2-3% of all pregnancies in the United States,

***Corresponding Author -** Dr B Nirmala Devi
*Associate professor, Department of Obstetrics and Gynaecology, Sri Venkateswera Medical College, Tirupati, Andhra Pradesh, India.

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representing a significant proportion of preterm births, whereas term prom occurs in 8% of pregnancies[2]. The etiological factors that are associated with PROM include low socioeconomic status, underweight, use of tobacco, history of PROM in a previous pregnancy, infections such as urinary tract infections, genital tract infections, bleeding per vagina at any time in pregnancy, cervical cerclage, and diagnostic and therapeutic procedures such as amniocentesis.[3]

The present study aimed to analyse the occurrence of PROM, labour outcome, maternal outcome, and perinatal outcome in premature rupture of membranes at term pregnancies among the Indian population. So that this research study may be used to find the best way to manage PROM in the future to reduce maternal and foetal morbidity and mortality.

AIM AND OBJECTIVES

AIM:

To study the maternal and perinatal outcome in premature rupture of membranes at term gestational age in the government maternity hospital, Tirupati.

OBJECTIVES:

1. To study the labour outcome, maternal morbidity and mortality in premature rupture of membranes at term gestation.
2. To study the perinatal morbidity and mortality in premature rupture of membranes at term gestation.

INCLUSION CRITERIA:

- Gestational age of ≥ 37 weeks confirmed by dates, clinical examination and by ultrasound examination.
- Labour does not set in and the uterus not acting.
- Singleton pregnancy
- Vertex presentation
- Those who are willing to participate in the study.

EXCLUSION CRITERIA:

- Congenital anomalies,
- Intrauterine death and multiple gestation
- Medical disorders like pregnancy-induced hypertension, gestational diabetes
- Pregnancy with prior caesarean section
- Gross contracted pelvis
- Those who are not willing to participate in the study.

Data analysis

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurement are presented on mean age and results on categorical measurements are presented in frequencies and percentages. Significance is assessed at a 5% level of significance. The following assumptions on data were made, Chi-square and Fisher Exact test has been used to find the significance
of study parameters on a categorical scale between two or more groups.

- Significant figures
- + Suggestive significance (P value: $0.05<P<0.01$)
- * Moderately significant (P value: $0.01 < P \leq 0.05$)
- ** Strongly significant (P value: $P \leq 0.01$)
- The Statistical software namely SPSS 22.0, was used for the analysis of the data and Microsoft Word and Excel have been used to generate graphs and tables.

MATERIALS AND METHODS

SOURCE OF DATA:

Patients were admitted to the Department of Obstetrics and Gynaecology with PROM at term gestation in GMH, Tirupati during the period from December 2020 to December 2021.

METHOD OF COLLECTION OF DATA:

A prospective hospital-based study was undertaken on 200 cases with 'PROM' at or above 37 weeks gestational age in the Department of Obstetrics and Gynaecology, GMH, Tirupati. The women were admitted, history was taken, LMP was confirmed, and the expected date of delivery was calculated and correlated with ultrasound examination findings. Clinical examination was performed and lab tests were done. Patients with pre-defined criteria were confirmed and selected for the study. Any ambiguity regarding the diagnosis or aetiology of PROM will be reviewed by two independent clinicians. Diagnosis of PROM was made by clinical examination, pooling test and nitrazine test. A drop of liquor obtained from vagina is put onto paper strips containing nitrazine test. It will turn blue, if pH is greater than 6.0 which means the membranes have ruptured. Data was recorded. Physical examination, obstetric examination and systemic examination were performed. Demographics, socioeconomic status, past history, and medical history were recorded. Abdominal examination was done for foetal presentation, foetal heart rate and any presence of uterine action.

The presence of amniotic fluid was detected using a sterile speculum inspection without the use of antiseptics, and a high vaginal swab was collected and sent for culture and sensitivity. A single and careful per vaginal examination was done to assess the bishop's score, for pelvic assessment and signs of chorioamnionitis. AFI by ultrasonography was recorded, and foetal monitoring is done by cardiotocography. All cases were given prophylactic intravenous antibiotics mostly cephalosporins. Interval between PROM and onset of labour was noted. Progress of the labour was monitored by partogram. The foetal condition was monitored. If labour was progressing with adequate uterine action expectant management was done. If labour was not progressing, induction was done with tablet misoprostol 25 micrograms 4^{th} hourly up to the maximum of 6 doses depending upon the cervical changes. Augmentation with oxytocin drip was done if uterine action was inadequate. Induction and delivery interval were noted. In partogragh any deviation from the normal curve, immediate intervention by operative delivery was done and the indication was noted. Complications like prolonged labour, obstructed labour, cord prolapse, arrest disorders, dry labour, labour dystocia, and retained placenta were documented. After the delivery neonatal outcome was assessed by gestational age, birth weight, and 'APGAR' score at 1 and 5 minutes were noted. Babies needing resuscitation like oxygen supplementation, Ambu bag, endotracheal intubation, oxygen plus Ambu bag, cardiopulmonary resuscitation, and drugs used were noted. Special neonatal care unit (SNCU) or neonatal intensive care unit (NICU) admissions were noted and followed up till discharge. Admission and recovery duration was recorded. Maternal morbidity after delivery such as postpartum haemorrhage, fever, wound infection and sepsis were noted and mothers were followed till discharge.

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RESULTS

Table1: Demographic factors- Age-wise distribution

Age (years)	No	Percentage%
15-19	26	13.00
20-24	128	64.00
25-29	34	17.00
30-34	10	5.00
>35	02	1.00
Total	200	100.00

Among the study population, the incidence of PROM was highest in the age group 20-24 years of 128 cases with 64%, followed by the age group 25-29 years of 34 cases with 17%, Age group 30-34 years of 10 cases with 5 % and 2 cases with 1% in the age group above 35 years.

Table 2: Distribution of Booked and Unbooked cases- Antenatal Care

	No	Percentage%
Booked	48	24.0
Unbooked	152	76.0

76.0% (n=152) of the study group were unbooked cases and 24% (n=48) were booked cases.

Table 3: Occupation

Occupation	No.of patients	Percentage%
Unemployed	109	54.5
skilled	78	39
Technical	13	6.5
Total	200	100

Among the study population, 54.5% (n=109) of the cases were unemployed, 39% (n=78) were skilled, 6.9% (n=13) were technical.

Table 4: Socio-economic status

Socio Economic Status	No of cases	Percentage%
Below Poverty Line	152	76
Above Poverty Line	48	24
TOTAL	200	100

'PROM' cases were higher in the below poverty line group contributing to 152 cases that are 76%, whereas 48 cases that are 24% belonged to the above poverty line.

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Table 5: Educational status

Literacy	No of patients	Percentage
Illiterate	40	20
Primary Education	76	38
Secondary Education	52	26
Under Graduate	24	12
Post Graduate	8	4
Total	200	100

Among the study population, 40% (n=80) were illiterates, 76% (n=152) were studied up to primary education, 52 %(n=104) studied up to secondary education, 24% (n=48) were undergraduates and 8% (n=16) were post graduates.

Table 6: Parity-wise distribution:

Gravida	No	Percentage
Primi	116	58.0
Multi	84	42.0
Total	200	100

58% (n=116) of the study population were primigravida and 42% (n=84) of the study population were multigravida.

Table 7: Time between PROM to Admission

Time in hours	No	Percentage
0-6	92	46
6-12	60	30
12-18	28	14
18-24	14	7
>24	6	3

Among the study population, 46% (n=92) of women were admitted within 6 hours of PROM,30% (n=60) of women were admitted within 6-12 hours, 14% (n=28) of women were admitted within 12-18 hours,7% (n=14) of women were admitted within 18-24 hours and 3% (n=6) of women were admitted after 24 hours of PROM

Table 8: Amniotic Fluid Index:

AFI in cm	No	Percentage
>10	5	2.50
8-10	82	41
6-8	61	30.5
<5	50	25
Nil	2	1
Total	200	100

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Among the study population, in 42% (n= 82) of the cases AFI was about 8-10, in 30.5% (n=61) AFI was about 6-8, in 25% (n=50) AFI was about <5, in 2.5 %(n=5) of the cases AFI was about >10, in 1% (n=2) of the cases, AFI was nil.

Table 9: BISHOP'S Score at the time of Admission

Bishop's Score	Primi		Multi	
	No	%	No	%
0-2	12	10.35	0	0
3-4	83	71.55	36	42.86
4-5	21	18.10	48	57.14
Chi-square	x^2=5.006* (p=0.025) df =1			

*Significant at 0.05 level.

In both primigravida and multigravida, the highest number of women had a BISHOPS score of 3-4, as seen in the table above. It is statistically significant at P<0.05 level.

Table 10: Induction to Delivery Interval

Time in hours	Primi		Multi	
	No	%	No	%
0-6	3	2.83	7	12.96
6-12	25	23.59	22	40.74
12-24	74	69.81	25	46.29
24-48	4	3.77	-	-
Total	100	100	54	100
Chi-square - $\chi 2$= 14.696** (p= 0.002) df= 3				

**significant at 0.001 level; P<0.01 level;

Among the study population, primigravida was 58% (n=116). Among the primigravida women n=116, 8 cases were delivered spontaneously, 2 cases were delivered by CS due to nil liquor, and the remaining cases (n=106) were induced depending on the progress of labour. Among the multigravida (n=84), 30 cases were delivered spontaneously, and the remaining cases (n=54), were induced depending on the progress of labour. In both primigravida and multigravida, the highest number of women delivered within 12-24 hours, with the shortest induction delivery interval of 2 hours. The average time from induction to delivery is 12.99 hours. It is statistically significant at the 0.01 level.

Table 11: PROM to Delivery Interval

Time in hours	Primi		Multi	
	No	%	No	%
0-6	6	5.17	8	9.52
6-12	16	13.79	14	16.67

12-24	72	62.07	51	60.71
>24	22	18.97	11	13.10
Total	116	100	84	100
Chi-square	$\chi 2$= 2.618@ (p= 0.454) df= 3			

@- Not significant

In both primigravida and multigravida, the most number of women delivered within 12-24 hours, with the shortest delivery interval of 2 hours, as seen in the table above. 62.07 % of the primigravida were delivered between 12 and 24 hours; 60.71 % of the multigravida were delivered between 12 and 24 hours. The average time from PROM to delivery interval is 20.74 hours. It is not statistically significant.

Table 12: Outcome of Labour

	Vaginal Delivery					Caesarean Section					Instrumental Delivery			
Mode of delivery	No	Spontaneous	Misoprostol	Oxytocin	%	No	Misoprostol	Oxytocin	Caesarean section without trial	%	No	Misoprostol	Oxytocin	%
Primi gravida	56	8	38	10	48.28	52	22	28	2	44.83	8	6	2	6.89
Multi gravida	72	30	22	20	85.71	10	4	6	0	11.90	8	1	2	2.38
	128					62								
Chi-square					$\chi 2$= 29.692** (p= 0.000) df= 2									

**significant at 0.01 level; (P<0.01)

64% (n=128) of the study population had normal vaginal delivery among them 19% [n=38] were delivered by spontaneous progression, 30% [n=60] by induction with misoprostol, 15% [n=30] by augmentation with oxytocin. 31% (n=62) delivered by caesarean section and 5% (n=10) delivered by instrumental delivery. In the study group, primigravidas were 58% (n=116), 48.2 %(n=56) of them were delivered by normal vaginal delivery, and 44.8 %

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(n=52) of them were delivered by caesarean section, 6.8% (n=8) of them were delivered by instrumental delivery.

In the study group, the multigravida population was 42 %(n=84), 85.71% (n=72) of them were delivered by normal vaginal delivery, and 11.91 %(n=10) of them were delivered by caesarean section, 2.38 %(n= 6) of them were delivered by instrumental delivery. The rate of normal delivery was higher in multigravida. Caesarean sections were more among primigravida. It is statistically highly significant.

Table 13: Indication for Caesarean Section

Indication	No	%
Failure to progress	30	48.39
Foetal distress	18	28.03
Deep Transverse arrest (DTA)	8	12.9
Obstructed labour	4	6.45
Severe oligohydramnios	2	3.23
Total	62	100

31% (n=62) of the study population delivered by caesarean section. Indication for caesarean section was failure to progress in 48.39 % (n=30), foetal distress in 28.03% (n=18), Deep transverse arrest in 12.9% (n=8), obstructed labour in 6.45% (n=4), severe oligohydramnios in 3.22% (n=2).

Table 14: Maternal morbidity

Morbidity	No	Percentage
Febrile morbidity	20	10
UTI	8	4
PPH	4	2
wound infection	4	2
Chorioamnionitis	2	1
Puerperal sepsis	1	0.5
TOTAL	39	19.50

In this study, the rate of maternal morbidity was 19.5%. The common morbidity among the study population was febrile illness was seen in 10% (n=20). Urinary tract infections were seen in 4% (n=8). Wound infection in 2 %(n=4), PPH in 2% (n=4), Chorioamnionitis in 1% (n=2) and Puerperal sepsis was seen in 0.5 %(n=1).

Table 15: APGAR score

APGAR	No.of Babies	Percentage
0-4	8	4
5-7	26	13
8-10	166	83
Total	200	100

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APGAR score was 0-4 in 8 babies (4%), 5-7 in 26 babies (13%), and 8-10 in 166 babies (83 %)

Table 16: Relation between PROM to delivery interval and maternal and neonatal morbidity

Duration (hours)	Maternal		Foetal	
	No	%	No	%
0-6	-	-	-	-
6-12	2	5.1	-	-
12-24	15	38.4	18	37.5
>24	22	56.4	30	62.5

The longer the time interval between PROM and birth, the higher the risk for the foetus and mother. 56.4% of maternal morbidity occurred with PROM to a delivery interval of greater than 24 hours. Foetal morbidity was 62.5% with PROM to delivery interval greater than 24 hours duration. Prolongation of the latent phase of labour has adverse effects on the mother and foetus.

Table 17: Cervical swab culture

organism	No	%
Staphylococcus	12	6
Group B Streptococcus	6	3
E.coli	4	2
Klebsiella	2	1
Coagulase-negative staphylococcus	2	1
Pseudomonas	2	1
Sterile	12	86

The above table shows that in 86 % (n=172) of cases, the culture was sterile. The
The most common bacteria isolated was Staphylococcus in 6% (n=12) cases, Group B streptococci was isolated in 3% (n=6) of cases and E.coli was isolated in 2% (n=4) of cases, Coagulase-negative staphylococcus was isolated in 1 % (n=2) of cases,
Pseudomonas was isolated in 1% (n=2) cases and klebsiella was isolated in 1% (n=2) cases.

DISCUSSION

PROM is one of the common complications of pregnancy which leads to significant maternal and foetal morbidity and mortality. The present study was undertaken to detect maternal and foetal outcomes in term pregnancies. The rate of caesarean section was high among the study population in primigravida. Subclinical urogenital infection was the most common complication (53 %), followed by oligohydramnios (25 %) and chorioamnionitis (13.5 %).

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Effects of maternal age on PROM:
In a study conducted by Anjana Devi[4] at JIPMER, Pondicherry (1996), 76.9% of the cases were between the ages of 20 and 29. In the present study, the most common age group was 20-24 years (64%) followed by 25-29 years (17%), followed by 15-19 years (13%) followed by 30-35 years (5%) followed by >35 years (1%).

Relationship of PROM to Antenatal care
In unbooked cases, PROM is higher than in booked cases.
In the study conducted by Amulya MN et al[5], 11 cases were booked (40.82%) and 71 cases were not booked (59.16%). In the present study, 76.0% of cases were unbooked cases.

Relationship to Socio-Economic Status
PROM is significantly increased by low socioeconomic status in the present study with 76% and is associated with malnutrition, inadequate hygiene, stress, high parity, recurrent genitourinary infections, and anaemia. According to a study conducted by Swati Pandey[6] at MGM Medical College in Indore (2000), 61% had a low socioeconomic status.

Relationship to obstetric score
In the present study, 58% were primigravidas and 42% were multigravidae in which the percentage of primigravidas was higher. In Umed Thakor's[7] study, 53.2% of the participants were primigravidas.

Table 18: Mode of delivery in term PROM in various studies

Mode of delivery	Jain[8] (%)	Swati Pandey[6] (%)	Singh et al.[9] (%)	Present Study (%)
LSCS	33.0	31	54.36	44.83
VD	67	37	45.63	48.28
Instrumental Delivery	-	3	-	6.89

Caesarean section rate and the number of vaginal deliveries of the present study was similar to Singh et al[9] study.

Maternal outcome

Table 19: Relationship between duration of PROM and maternal morbidity

Duration (Hours)	**Maternal Morbidity (Present Study)**		**Rakholia S et al.[10]**	**Bangal V et al [11]**
	No.	%	%	%
0-6	0	0	0	0
6-12	2	5.1	0	0
12-24	15	38.4	16	15.09
>24	22	56.4	64	50

Maternal morbidity is due to intrapartum infection which results from the spread of ascending genital infection to the amniotic cavity due to the absence of the protective barrier of amniotic membranes in cases of PROM. Febrile morbidity is the commonest morbidity seen in all the research groups and the present study.

Maternal morbidity was observed in 21% of patients in the Kodkany[12] research. With puerperal pyrexia comparable to 19.5% of the individuals in the present study. Singhal[13], on the other hand, found a 4% maternal morbidity rate in their research.

Neonatal Outcome:

Table 20: Perinatal outcome of PROM in term gestation

	Perinatal Morbidity	Perinatal Mortality
Present Study	24%	0.5%
Sanyal et al [14] study	32%	5%
Anjana devi et al.[4]	-	4.8%
Kodkany[12]	39.8%	-

There is a significant relation between prom and foetal risk of birth asphyxia, respiratory distress syndrome, jaundice and septicaemia.

Perinatal morbidity in Kodkany[12] was 39.8%, with birth asphyxia accounting for 29.5 %. Perinatal mortality was 4.8 % in Anjana Devi[4] study. Perinatal morbidity was 32% and perinatal mortality 5% in Sanyal et al [14] Study. This study resembles the present study.

In the present study perinatal morbidity was 24% and the mortality rate was 0.5%. Respiratory distress syndrome was seen in 14 % (n=28) of babies. Birth asphyxia was seen in 5 %(n=10). Septicaemia was seen in 1.5 %(n=3). Jaundice was seen in 3 % (n=6) babies. Convulsions were seen in 0.5 %(n=1) of babies and Perinatal mortality was 0.5% in the present study. The neonates born with the above complications were admitted and managed in the intensive care unit.

CONCLUSION

● PROM is a complicated obstetric condition that affects 5-10% of all pregnancies and there is a risk of maternal, and perinatal morbidity and mortality. The important elements to limit the adverse consequences of PROM are the assessment of etiological risk factors, confirmation of the diagnosis, and prompt management of the cases.

● The foci of infection should be diagnosed and treated as soon as possible.

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● Women who are pregnant with PROM should have supervised labour, ideally in a tertiary care hospital with the well-equipped intensive care facility. Each case must be dealt with on an individual basis.
● PROM is extremely important for the further fate of pregnancy outcome. Late diagnosis is a missed opportunity for effective treatment. A collaborative effort between an obstetrician and a neonatologist is required for the effective management of the case.
● To decrease the morbidity and mortality associated with PROM at term pregnancy early diagnosis, proper monitoring and effective management is essential for a better outcome.
All pregnant mothers should be educated about the importance of regular antenatal visits, proper nutrition, personal hygiene and warning signs of complications like PROM, and other medical conditions.

CONFLICT OF INTEREST: There is no conflict of interest**.**

FUNDING: There are no funding sources.

ETHICAL COMMITTEE APPROVAL: The study was approved by institutional ethical committee.

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