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A Prospective Study on Bacterial Colonization in Women with Preterm Premature Rupture of Membranes and its Maternal and Fetal Outcome in a Tertiary Care Centre

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Abstract: ***Background: PPROM is a multifactorial entity and it is the main cause of preterm birth that can result in high perinatal mortality & morbidity along with maternal morbidity. With regard to the importance of maternal genital tract colonization as an etiological factor in PPROM, appropriate antibiotic therapy has a cardinal role in prevention & treatment of maternal & neonatal complications. The aim of this study is to identify the microbiota in women with PPROM by High vaginal swab & its antimicrobial sensitivity, and to study the risk factors, maternal and neonatal morbidity and mortality trends in PPROM. Methods: The study group includes 120 patients presenting with pPROM between 28-37weeks of gestation under the Department of Obstetrics and Gynaecology at Govt Raja Mirasudhar Hospital attached to Thanjavur Medical college and Hospital for a period of one year from January 2020 - December 2020. Results: In my study, the most common organism isolated was E.coli followed by Klebsiella, Pseudomonas, coagulase negative staphylococcus aureus and candida. Most of the organism isolated was sensitive to Amikacin and Gentamycin followed by cefotaxim and ciprofloxacin. Most of the patients had no risk factors for developing pPROM and the most common risk factors was breech presentation followed by previous history of pPROM. Most of the mothers had no complications and the most common maternal complication encountered was wound infection followed by chorioamnionitis. The most common neonatal complication was Respiratory distress syndrome followed by neonatal sepsis. Conclusion: PPROM is a fair complication of pregnancy that leads to various maternal and neonatal complications. So, the management of PPROM include hospitalization, administration of antibiotics to prevent infection, corticosteroid administration for fetal lung maturity, use of short term tocolytics till fetal lung maturity is achieved and active intervention to be done if infection is suspected or if labour is no longer preventable.***

Keywords: Mac conkey agar, Blood agar, Muller Hilton Agar, Kirby Bauer method, E.coli, Klebsiella, Pseudomonas, coagulase negative s.aureus candida gentamycin, amikacin, chorioamnionitis, Respiratory distress.

1. Introduction

Preterm premature rupture of fetal membranes is defined as spontaneous rupture of membrane any time beyond 28weeks of gestation and before onset of labour within 37completed weeks of gestation[1].PPROM complicates 2-4% of all pregnancies and accounts for about 40-50% of preterm births[2, 3]. In most of the cases of PPROM, the cause is not known and believed to be multifactorial[4].

At term, the membrane rupture is a physiological process but if it occurs in preterm period, it may be due to abnormal structural weakening of the membrane which is initiated by stretching of the fetal membrane leading to inflammation and ascending bacterial colonization.The bacterial pathogen will produce enzymes like collagenases and proteases which will weaken the chorioamnion membrane but other mechanism involved in the pathogenesis includes disproportionate response of matrix metalloproteinases (MMP) and tissue inhibitor of matrix metallo proteinases (TIMPs) in response to bacterial invasion/uterine overdistension[5] or increased maternal cytokines release in response to inflammation.

Preterm premature rupture of membrane requires immediate attention. The diagnosis of PPROM usually made from patients history, clinical examination and by doing some simple tests. The present study undertaken is to provide an appropriate treatment protocol for antibiotic usage in pPROM cases as use of appropriate antibiotics helps in preventing maternal and neonatal complications in pPROM.

Aim and Objective

1) To identify the microbiota in women with preterm premature rupture of membrane byHigh vaginal swab & its antimicrobial sensitivity
2) To study the maternal & neonatal morbidity & mortality trends in preterm premature rupture of membrane.

2. Materials and Method

Study Design: Prospective observational study

Study Place: Department of Obstetrics and Gynaecology, Government Raja Mirasudhar Hospital, Thanjavur medical college, Thanjavur

Study Duration: January 2020 to December 2020.

Study Population: 120 patients admitted with Pprom between 28-37weeks of gestation

Inclusion Criteria: All pregnant women between 28 to 37weeks of gestation with Preterm premature rupture of membrane admitted in labour room

Exclusion Criteria:

- PROM more than 37weeks
- Antibiotic usage before culture
- Congenital anomalies
- Intrauterine death.

3. Study Procedure

After IEC approval & after getting consent from the patient, detailed history from the patient was collected and clinical examination was done. Sample was collected by High vaginal swab. Under strict aseptic precaution, swab was inserted into posterior fornix of vagina & gently rotates the swab for 10-30 secs Withdraw the swab without touching the skin & kept it in the screw capped bottle provided. Two high vaginal swabs were taken and sent for gram staining & culture and sensitivity .One High Vaginal Swab was sent for Gram Staining & another High Vaginal Swab was sent for culture in Mac Conkey Agar and Blood Agar. Mac Conkey Agar promotes the growth of Gram negative Bacilli. Blood Agar promotes the growth of Gram Positive Cocci and fungal species. Colony growth was seen in culture media after an incubation period of 24hrs to 48hrs.Then the growth was incubated for 24hrs in Muller Hilton Agar for detecting antibiotic susceptibility by Disc Diffusion method [Kirby Bauer method].

Antibiotics as per institution protocol was given to the patient till the culture & sensitivity report arrive and then antibiotics as per culture and sensitivity given for seven days .Mother and the newborn was followed up till discharge for maternal and neonatal complication.

4. Results and Analysis

Table 1: Distribution of Risk factors for PPROM

Risk factors	Cases	
	No	%
No risk factors	83	69.2
Breech	10	8.3
History of recent coitus	7	5.8
Previous history ofPROM	8	6.7
Polyhydramnios	8	6.7
Twins	2	1.7
UTI	2	1.7
Total	120	100.0

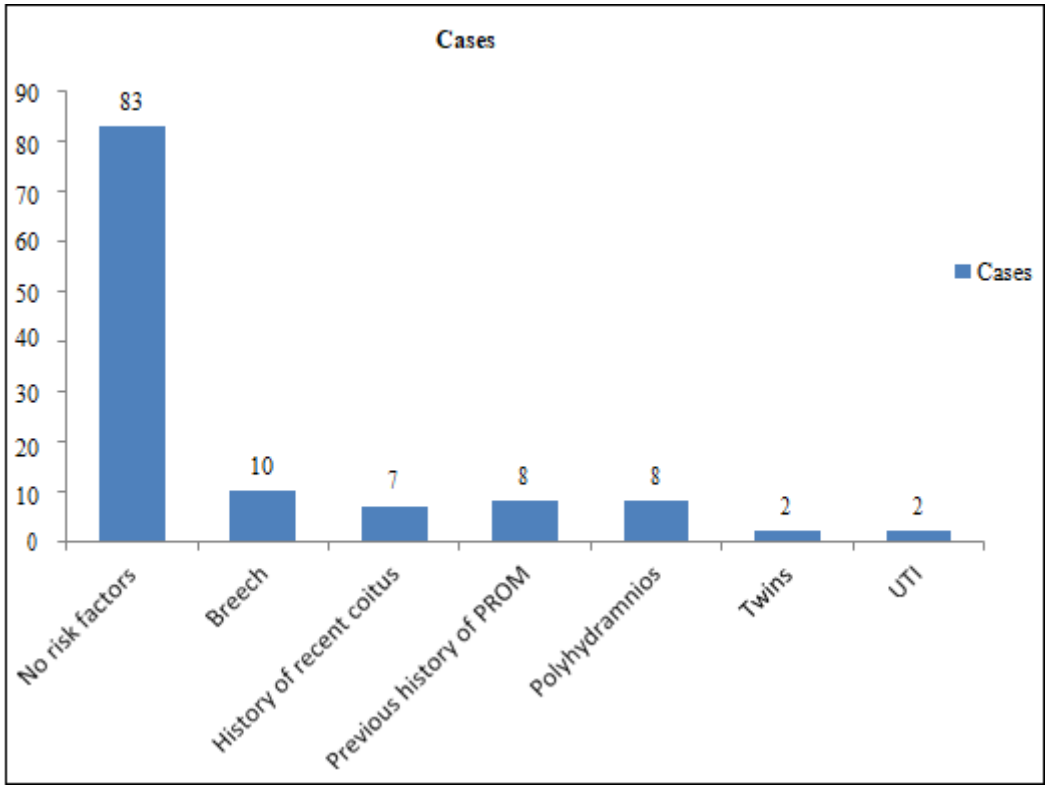

Figure: Bar diagram showing distribution of risk factors

In our study 69.2% patients had no risk factors. The commonest risk factor was breech presentation (8.3%) followed by patients with previous history of pprom (6.7%), polyhydramnios (6.7%), history of recent coitus (5.8%), twins (1.7%) and UTI(1.7%)

Table 2: Distribution of High Vaginal Swab growth positivity

HVS	Cases	
	No	%
No growth	70	58.3
Positive Growth	50	41.6
Total	120	100.0

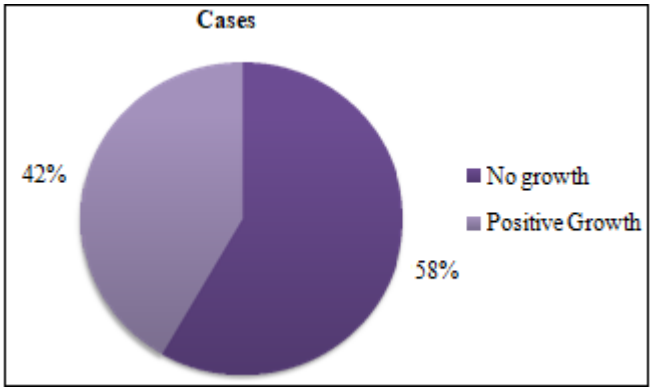

Figure: Pie Diagram showing Distribution of High Vaginal Swab growth positivity

Among 120 study population, 70 patients (58.3%) had no growth in culture and 50patients (14.2%) were positive for growth.

Table 3: Distribution of Type of Organisms Isolated

	Cases	
	No	**%**
No growth	70	58.3
E. coli	17	14.2
Klebsiella	15	12.5
PseudomonasAeruginosa	8	6.7
CONS	8	6.7
Candida	2	1.7
Total	120	100.0

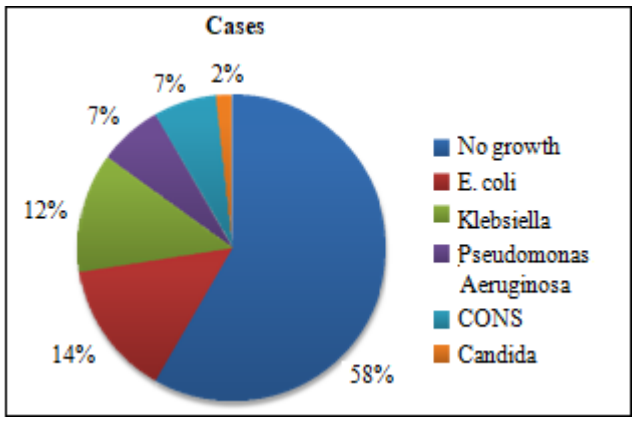

Figure: Pie Diagram showing Distribution of Type of Organisms Isolated

Among the isolated organisms, E.Coli was the most common organism found in the culture contributing to 14.2% of cases, followed by klebsiella in 12.5% cases, pseudomonas aeruginosa and coagulase negative staphylococcus aureus each contributing to 6.7% and candida species in1.7% cases.

Table 4: Antibiogram of isolated organisms

Antibiogram of Isolated Organism- E.Coli

	E.Coli	
	No	%
Amikacin	17	100
Gentamycin	15	88
Cefotaxim	2	12

The most common organism isolated from the culture was E.coli which was sensitive to Amikacin in 100% of cases, Gentamycin in 88% of cases, Cefotaxim in 12% of cases.

Antibiogram of Isolated Organism -Klebsiella

	Klebsiella	
	No	%
Amikacin	15	100
Gentamycin	15	100
Cefotaxim	4	26
Ciprofloxacin	7	47

The isolated organism klebsiella was sensitive to Amikacin and Gentamycin in 100% cases, ciprofloxacin in 47% of cases and cefotaxim in 26% cases.

Antibiogram of Isolated Organism Pseudomonas

	Pseudomonas	
	No	%
Piptaz	8	100
Ciprofloxacin	6	75
Amikacin	6	75
Gentamycin	3	37.5

The isolated organism Pseudomonas aueroginosa was sensitive to piperacillin and tazobactam in 100% of cases, ciprofloxacin and Amikacin in 75% cases and Gentamycin in37.5% cases.

Antibiogram of Isolated Organism CONS

	Cons	
	No	%
Amikacin	6	75
Gentamycin	8	100
Cefotaxim	2	25

Coagulase negative staphylococcus auerus organism was sensitive to Gentamycin in100% of cases, Amikacin in 75% cases and Cefotaxim in 25% cases

Antibiogram of Isolated Organism Candida

	Candidia	
	No	%
Clotrimazole	2	100

The isolated organism candida was sensitive to clotrimazole in100% cases.

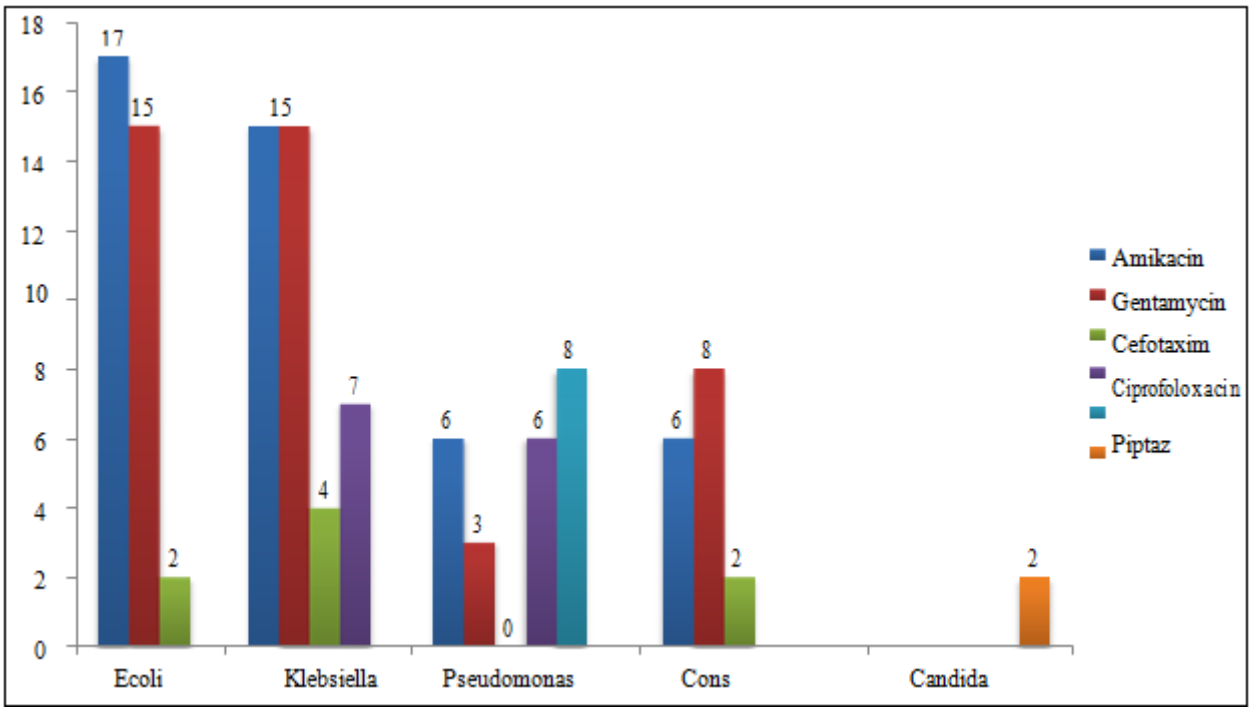

Figure: Bar Diagram showing Distribution of Antibiogram of Isolated Organisms

Table 5: Distribution of Maternal Complications

Maternal Complications	Cases	
	No	%
No complications	92	76.7
Abruption	6	5
Wound infection	11	9.2
UTI	5	4.2
Chorioamnionitis	6	5
Total	120	100.0

Table 6: Distribution of Neonatal Complications

Neonatal Complications	Cases	
	No	%
No complications	85	70.8
RDS	20	16.7
Septicaemia	9	7.5
Jaundice	4	3.3
IVH	2	1.7
Total	120	100.0

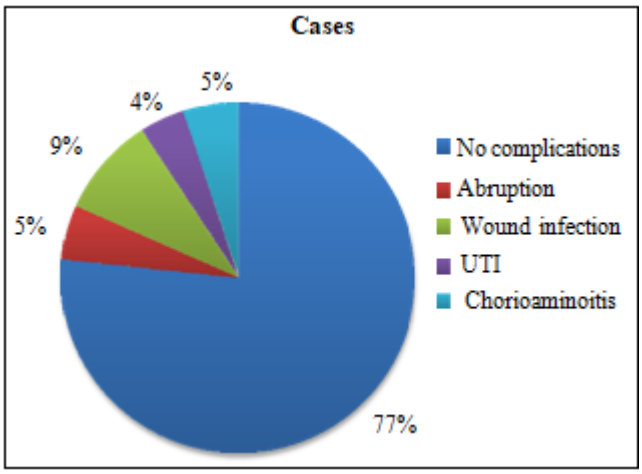

Figure: Pie Diagram showing Distribution of Maternal Complications

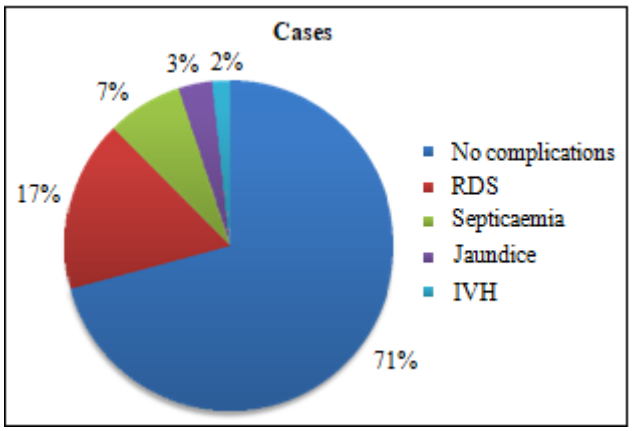

Figure: Pie Diagram showing Distribution of Neonatal Complications

Among the study population, 92patients with pPROM (76.7%) had no maternal complications. The most common maternal complication noted was wound infection found in 11 patients (9.2%) followed by chorioamnionitis and abruption each contributing to 5% and UTI in 4.2% cases**.**

Almost 70.8% of the newborn had no complications. The most common neonatal complication noted was respiratory distress syndrome in 16.7% newborn followed by septicemia in 7.5% newborn, 3.3% suffered from jaundice and 1.7% had intraventricular haemorrhage.

Preterm babies

Table 7: Distribution of NICU Admission

NICU	**cases**	
	No	**%**
Yes	91	75.8
No	29	24.2
Total	120	100.0

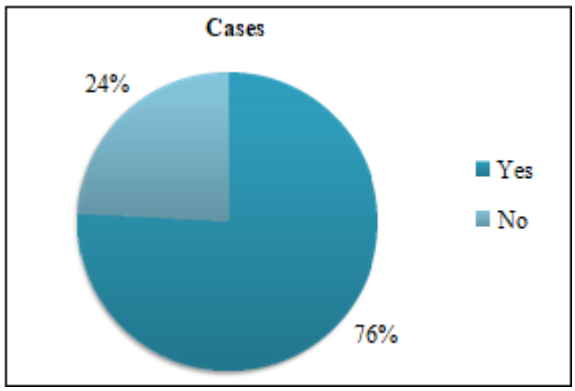

Figure: Pie Diagram showing Distribution of NICU Admission

In our study, 91 babies (75.8%) had no NICU admission whereas 29babies (24.2%) wereadmitted in NICU.

Table 8: Comparison of Maternal Complications with High Vaginal Swab culture amongmy study subjects

Maternal Complications	HVS			P value
	No Growth	Positive	Total	
No complications	57	35	92	>0.05 (NS)
Abruption	2	4	6	
Wound infection	6	5	11	
UTI	3	2	5	
Chorioaminoitis	2	4	6	
Total	70	50	120	

P value >0.05 not significant by applying Chi Square Test

The above table illustrates that there is no correlation between infection and increased maternal complications.

Table 9: Comparison of Neonatal Complications with High Vaginal Swab cultureamong my study subjects

Complications	HVS			P value
	No Growth	Positive	Total	
No complications	50	35	85	0.05(NS)
RDS	13	7	20	
Septicemia	3	6	9	
Jaundice	2	2	4	
IVH	2	0	2	
Total	70	50	120	

P value < 0.05 not significant by applying Chi Square Test

Among neonatal complications, neonatal sepsis were more common inneonates born to culture positive women which was 66.6%

Table 10: Comparison of NICU admission with High Vaginal Swab culture growthpositivity among my study subjects

HVS	NICU admission			P value
	Yes	No	Total	
No growth	11	59	70	<0.05* (S)
Positive	18	32	50	
Total	29	91	120	

Out of 24.16% NICU admission in our study, neonates born to culture positivewomen had more NICU admission which was 15% and it was statistically significant.

5. Discussion

Preterm premature rupture of membrane requires immediate attention as it leads to various maternal and neonatal complications. The key way to reduce the adverse effects of pPROM is to make a prompt diagnosis, admission and start antibiotic coverage.

The present study was undertaken to provide an appropriate treatment protocol for antibiotic usage in pPROM cases as use of appropriate antibiotics helps in preventing maternal and neonatal complications in pPROM and to study the risk factors for pPROM and the fetomaternal complications associated with pPROM.

1) Distribution of Risk factors

Among the study population, 69.2% had no risk factors whereas the most common risk factor for pPROM in our study was breech presentation accounts for 8.3%cases which was similar to the results obtained in the study Gunn et al[6].The second most common risk factor was previous history of pPROM (6.7%) and polyhydramnios (6.7%) followed by twins and UTI(1.7%).

2) Distribution of Organisms isolated from High vaginal swab culture:

High vaginal swab culture & sensitivity was done in all study population which showed 58.3% had no growth in culture. Among the culture positive population, E.coli was the most common organism isolated accounted for about 14.2% which was similar to the result obtained in the studies Swathi pandey et al[7] (2000) Kamala Jayaram and Kerur & colleague [8](2006) Amina Beevi P et al[9](2018) followed by klebsiella (12.5%), Pseudomonas aueroginosa(6.7%) and coagulase negative staphylococcus aureus (6.7%) and candida (1.7%).

3) Distribution of Antibiogram for the isolated organisms:

The most common organism isolated from the high vaginal swab culture was E.coli which was 100% sensitive to Amikacin and 88% sensitive to Gentamycin.. In my study, most of the organisms were sensitive to Amikacin and Gentamycin which was similar to the results obtained in the studies T.Seshasai et al[10](2015) Amina Beevi et al[9](2018) followed by Cefotaxim and ciprofloxacin.

4) Distribution of maternal complications:

In our study, 23.3% of population had maternal complications of which wound infection was predominating 9.2% . 5% of population had chorioamnionitis which correlates with the study of Artal K et al[11](1976) in which 3% had chorioamnionitis.

5) Distribution of neonatal complications:

Out of 24.2% babies admitted in NICU, 16.7% had respiratory distress syndrome followed by septicemia (7.5%), jaundice (3.3%) and intraventricular haemorrhage (1.7%). This was similar to the result obtained in a study conducted by Emeche et al where 61% of the babies had respiratory distress syndrome

6) Distribution of NICU admissions:

Among the study population, 24.2% of the babies born to pPROM mothers were admittedin NICU which was similar to the result obtained in the study Shweta Patil et al[7](2000)

6. Conclusion

Preterm premature rupture of membrane is often unexpected and the cause is often hard to identify. pPROM is a fair complication of pregnancy that leads to various maternal and neonatal complications. So, appropriate evaluation and management is important for improving neonatal outcomes. The use of antibiotics in the latent period can reduce the maternal complications like chorioamnionitis and puerperal pyrexia. In my study, most of the isolated organism were sensitive to Amikacin and Gentamycin . So, appropriate antibiotic usage will reduce maternal and neonatal complications in pPROM. Septicemia in neonates can also be prevented by using antibiotics. Administration of corticosteroids in pPROM of gestational age less than 34weeksreduces the neonatal complications like respiratory distress syndrome which is the most common cause of neonatal deaths. Neonatal care facilities can be improved to manage neonatal emergencies so as to reduce neonatal deaths.

References

[1] Cunningham FG, Leveno KJ, Bloom SL, et al. Williams obstetrics. 24th edn. McGraw-Hill Education 2014
[2] Naeye, R.L.; Peters, E.C. Causes and consequences of premature rupture of fetal membranes. Lancet Lond. Engl. 1980, 1, 192–194. [CrossRef]
[3] Mercer, B.M.; Goldenberg, R.L.; Meis, P.J.; Moawad, A.H.; Shellhaas, C.; Das, A.; Menard, M.K.; Caritis, S.N.; Thurnau, G.R.; Dombrowski, M.P.; et al. The Preterm Prediction Study: Prediction of preterm premature rupture of membranes through clinical findings and ancillary testing. The National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Am. J. Obstet. Gynecol. 2000, 183, 738–745. [CrossRef]
[4] Parry S, Strauss JF. Mechanism of disease: premature rupture of the fetal membranes. N Engl J Med. 1998;338:663-70.
[5] www.mdedge.com/emed-journal/dsm/6454/ obstetrics/pprom
[6] Gunn GC, Mishell DR, Morton DG. Premature rupture of membranes, a review: Am J ObstetGynec 1970; 106:469.
[7] Pandey Swati, Dave et al, Maternal and fetal outcome in cases of preterm premature rupture of membranes. Journal of obstetrics and Gynaecology of India. 2000; 50-63
[8] Kerur BM, Vishnu Bhat B, Harish BN, Habeebullah S, Uday Kumar C. Maternal genital bacteria and surface colonization in early neonatal sepsis. Indian J Pediater 2006; 73: 29-32
[9] Amina Beevi P, Girija Kumari AG, Sudhamani C. High vaginal swab study in preterm labour and preterm premature rupture of membranes and its relationship with neonatal sepsis. J. Evid. Based Med. Healthc. 2018; 5(30), 2249-2254. DOI: 10.18410/jebmh/2018/466
[10] Seshasai T, Sukanya S. Bacteriological study of endocervix in preterm labour and preterm premature rupture of membranes. IJSR 2015;4(7):915-919.
[11] Artal K, Sokal RJ, Neuman M, Burstein AH, Stojkor J. The mechanical properties of prematurely and non-prematurely ruptured membranes. Am J ObstetGynecol 1976; 125: 655-659