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International Journal of Current Research
Vol. 10, Issue, 02, pp.66143-66147, February, 2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

PREGNANCY OUTCOME OF PRETERM PREMATURE RUPTURE OF MEMBRANES

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ARTICLE INFO

Article History:
Received 19th November, 2017
Received in revised form
13th December, 2017
Accepted 09th January, 2018
Published online 28th February, 2018

Key words:

Preterm Premature Rupture of Membranes, PICU, Maternal and Neonatal outcome, Perinatal mortality.

ABSTRACT

The aim of this study is to evaluate the maternal and foetal outcomes of patients whose pregnancies were complicated by Preterm Premature Rupture of Membranes (PPROM) over a period of three years. In this retrospective study, 135 pregnant patients with PPROM were selected (PPROM). Among them 126 pregnancies were singletons and 9 were twin pregnancies. Patients' age ranges from 20 to 44 years and mean age was noted to be 31 years. The gestational age of the patients at the time of PPROM ranges from 21 to 36+6 weeks (before 37 completed weeks). The mean gestational age at the onset of membrane rupture and at the time of delivery was 31+4 and 33+2 weeks, respectively. Neonatal outcome was determined by the following four parameters: perinatal mortality, weight of the newborn, Apgar score, and last but not least, admission to Paediatric Intensive Care Unit (PICU). Similarly, maternal outcome included: maternal morbidity including puerperal pyrexia and clinical chorioamnionitis, mode of delivery, and maternal mortality. Of the 135 patients, 96 (71.1%) of them had frequent hospital visits. In this study, a large number of patients delivered after one week of preterm premature rupture of membranes (PPROM), and, most importantly, no maternal mortality was witnessed. Overall, perinatal mortality was shown to be 9%.

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Citation: Dr. Beenish Ashraf, Dr. Yu-yan Ma and Dr. Muhammad Shahbaz, 2018. "Pregnancy outcome of preterm premature rupture of membranes", *International Journal of Current Research*, 10, (02), 66143-66147.

INTRODUCTION

Premature Rupture of Membranes (PROM) is defined as rupture of amniotic membranes beyond 37 weeks of gestation prior to the onset of labour. Whereas when rupture of membranes takes place prior to 37 completed weeks of gestation is known as preterm premature rupture of membranes (PPROM) (Allahyar Jazayeri, 2017). The following risk factors are known to be associated with PPROM: low socioeconomic status, low body mass index, tobacco smoking, history of preterm labour, recurrent UTIs, vaginal bleeding in pregnancy, and undergoing minor gynaecological procedures such as cerclage and amniocentesis (Mercer *et al.,* 2005). PPROM is the major identifying cause of preterm delivery and is associated with 30-40% of preterm births. 85% of neonatal morbidity and mortality is caused by prematurity. 3% of all pregnancies are complicated by PPROM in the United States, and about 1.5 lac pregnancies every year are affected by PPROM. The initial steps in the management of PPROM include a sterile speculum examination to establish diagnosis of PPROM, assessment of maternal vital signs with continuous foetal monitoring initially to establish foetal status, and performing Ultrasonography to evaluate gestational age, foetal weight, foetal presentation, and amniotic fluid index.

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Digital examination is generally avoided, but visual inspection of the cervix can accurately estimate cervical dilatation. Digital examination of the cervix with PPROM has been shown to shorten latency and increase risk of infections without providing any additional useful clinical information (Simhan and Canavan, 2005). Although the management of PPROM has developed through various cycles of obstetric activity from being neglect to immediate intervention, the key factor in the foetal and maternal outcome is that the diagnosis of prelabour rupture of membranes must be established promptly. Management of PPROM is based on multiple factors: gestational age, foetal viability at the onset of PPROM and both maternal and foetal well-being at the time of rupture of membranes and thereafter. PPROM is either managed expectantly or actively. Active management involves delivery within 24-48 hours of rupture of membrane, as the risk of infection is considerably high. Gestational (1962) demonstrated that after 36 weeks of gestation, 80% of the mothers progressed into labour within 24 hours, whereas before 36 weeks only 50-70% went in labour within 48 hours. The elective universally-accepted timing for planned delivery for women whose pregnancies are complicated with PPROM is 34 weeks of gestation (Newton, 2005). Gun *et al.,* (1970) reported an increased perinatal mortality rate after 48 hours of PPROM and advocated an early delivery. While, on the other hand, Cushner (Cushner, 1972) recommends expectant management unless there are signs of sepsis, since neonatal

morbidity and mortality associated with PPROM is primarily due to prematurity and low birth weight. The aim of the current study is to evaluate the pregnancy outcome of patients who deliver before 37 completed weeks of gestation with Preterm Premature Rupture of Membranes (PPROM) over a period of three years in Qilu Hospital of Shandong University.

MATERIALS AND METHODS

This was a retrospective study, conducted in the Gynaecology and Obstetrics Department of Qilu Hospital of Shandong University from 2014 to 2017, which included patients with complications of PPROM. This study was designed and conducted in accordance with the local regulations in China. Also, it received approval from the Ethical Review Committee of Qilu Hospital of Shandong University. All the patients selected in our study were required to fulfil the following Inclusion Criteria: gestational age should be beyond 20 and < 37 completed weeks regardless of singleton / twin pregnancy. However, all the patients who had an onset of PPROM after 37 completed weeks of gestation were excluded from the study. According to our study, initially, patients were admitted to the maternity ward for maternal and foetal assessment. After stabilizing maternal condition and finding no evidence of foetal distress, ultrasound scan was done to evaluate the levels of amniotic fluid, foetal growth, presentation, and foetal anatomy. To rule out infection, amniocentesis was performed; however, this was only done at the discretion of the attending physician. A detailed history from patients was taken: their age, parity, menstrual and obstetric history with emphasis on accurate account of time and duration of rupture, amount of fluid leaking and pain association, history of similar episodes in previous pregnancies and history suggestive of incompetent cervical os were noted. 47 patients (35%) did not have any risk factor associated with PPROM; however, 88 patients with PPROM (65%) were found to have risk factors such as GDM, uterine anomaly, placental abnormalities, malpresentation, multiple gestations, oligohydramnios, and mild- severe Pre-eclampsia, and the incidence of clinical chorioamnionitis was noticed to be 11%.(Table 1)

Table 1. Risk Factor Associated With PPROM

Sample Percentage	Risk Factor Associated With PPROM
35%	No Risk Factors
65%	GDM, uterine anomaly, placental abnormalities, malpresentation, multiple gestations, oligohydramnios, mild- severe Preeclampsia, and chorioamnionitis

In our study, 62 patients (46%) had low Amniotic Fluid Volume at the time of delivery. Also, 97 patients (72%) had a past medical history of miscarriages. 14 patients (10.4%) underwent In Vitro Fertilization (IVF). Also, patients' sexual history regarding recent intercourse, history of strenuous physical exertion and vaginal examinations, if any before admissions, were taken into account. Gestational age was measured by either determining the date of the patient's last menstrual period and/or ultrasound dating. Without further ado, every patient received an ultrasound scan after being admitted to hospital. Pelvic examination using a sterile speculum was performed; however, digital examination was avoided until delivery was planned. Diagnosis of PPROM was established through history and confirmed by the presence of pooled amniotic fluid on a sterile speculum, ferning test, and transvaginal ultrasonographic evaluation was also done in some cases.

Each patient was observed in the labour and delivery room for at least 24 hours. Foetal viability was dictating the management protocols. At the age of viability, external foetal monitoring was performed to assess foetal well-being. Patients without evidence of infection were transferred to the high-risk maternal ward. Antenatal management ranged from performing daily non-stress tests to four hourly monitoring of patients' vital signs and body temperatures. Tocolytic therapy was restricted to those patients who progressed towards spontaneous preterm labour (Figure 1). Magnesium Sulphate (MgSO4) and Ritodrine were shown to be the tocolytic agents of choice, which were given to 79 patients (58.5%), where 71 (52.5%) of them received tocolysis for a brief period of 1 to 4 days, and only 8 (6%) patients had tocolytic agents for an extended period of 5 to 10 days. When the onset of PPROM was prior to viable gestational age, such patients were managed and observed in out-patient settings and then admitted to in-patient facility at the age of viability.

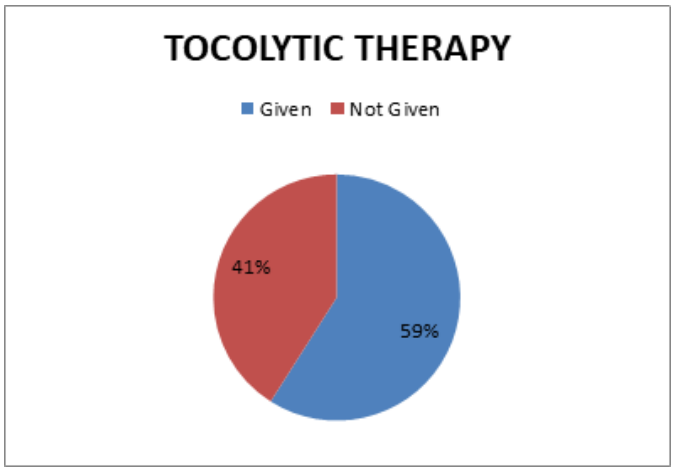

Figure 1. Tocolytic Therapy

Of the 135 patients, 96 (71.1%) of them had frequent hospital visits. After every 3 to 4 weeks interval, ultrasound was performed to evaluate foetal growth. At viability, patients with spontaneous preterm labour but with no traces of infection were administered intravenous magnesium sulfate (MgSO4) and prophylactic antibiotics: Cefazoline, Flucloxacilin, Cefmetazone, Azithromycin, Methicillin, Ceftriaxone, Meropenem, Tinidazole, Amoxicillin, Cefotiam. The use of corticoisteroid was limited to those patients whose foetuses were yet to acquire lung maturation. In this regard, Dexamethasone was the corticosteroid of choice, which was given to 85 patients (62%) to achieve foetal lung maturity. Indications for delivery included clinical chorioamnionitis, non-reassuring assessment for foetal well-being, foetal death, advanced labour, or failed tocolysis. If infection was identified, delivery was accelerated and the use of broad-spectrum antibiotics was initiated. Following delivery, those newborns who were required intensive care were admitted to paediatric intensive care unit (PICU) and all the neonates who required antibiotics were initiated antibiotic therapy while the results of the septic work up were under way. Evaluation for potential intraventricular haemorrhage, head roentgenography was ordered by the attending paediatrician for all newborns at birth—and as per requirement thereafter as part of routine neonatal check-up.

RESULTS

Of the 135 patients with Preterm Premature Rupture of Membranes (PPROM) selected for this retrospective study, 126 patients were with singleton and 9 of them with twin pregnancies. The age of the patients ranges from 20 to 44 years and the mean maternal age was seen to be 31 years. At the onset of PPROM, gestational age of the patients chosen for this study ranged from 21 to 36+6 weeks (less than 37 completed weeks). The mean gestational age at the onset of rupture of membranes was noted to be 31+4 weeks and at the time of labour was 33+2 weeks. The Perinatal survival rate was based primarily on gestational age at the onset of PPROM. In our study (Table 2), only 5 patients delivered before 26 completed weeks of gestation, and neonatal survival rate was noted to be 20% (n=1) among this gestational age group as opposed to those 96%(n=130) patients who delivered after 26 completed weeks of gestation where survival rate was reported to be 94% (n=122).

Table 2. Survival rate before and after 26 weeks

Sample Percentage	26 completed weeks of gestation	Survival rate
4%	Before	20%
96%	After	94%

Maternal outcome

Almost all the patients included in this retrospective study were given antibiotics after delivery. As far as mode of delivery is concerned, 49% (n=66) patients underwent Caesarean Section and 51% (n=69) had normal vaginal delivery (Figure 2).

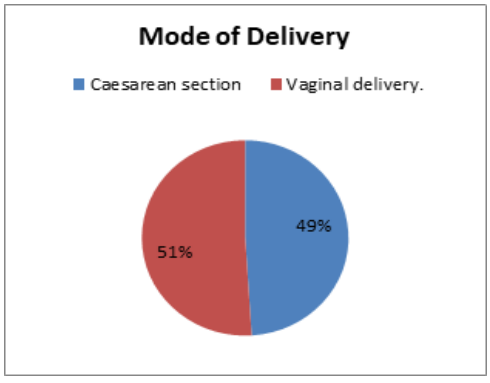

Figure 2. Mode of Delivery

The most salient feature of this study was maternal mortality rate; no maternal death was reported in this study. Maternal pyrexia is a strong indicator of early delivery in PPROM patients. Similarly, C - reactive protein (CRP) is another factor of paramount importance which indicates maternal infection. In our study, 32 patients (24%) had raised CRP at the onset of PPROM and 26 patients (19%) were found to have raised CRP even before delivery (Table 3).

Table 3. Levels of C –Reactive Protein (CRP)

Sample Percentage	C - Reactive Protein
24%	Onset of PPROM
19%	At the time of delivery

25 mothers (18.5%) were shown to have high temperatures before going into labour and 15 patients (11%) were diagnosed to have clinical chorioamnionitis, which was considered a reliable indicator for delivery. The latency period from the onset of PPROM to delivery ranged 0 to 61 days with a mean of 8 days. One of the most common complications of PPROM is early delivery. Consequently, 90% (n=122) of the patients delivered within one week after the onset of premature rupture of membranes in this retrospectively designed study, and 12.5% delivered below 30 weeks of gestation.

Neonatal Outcome

When it comes to neonatal outcome (Table 4), the birth weight of the newborn, Apgar score at birth, PICU admissions, and perinatal mortality are known to be invaluable factors to consider. In this retrospective study, overall, perinatal mortality was shown to be 9% (n=12).

Table 4. Overall Neonatal Outcome

Neonatal Outcome	Sample Percentage
Neonatal Mortality Rate	9% (n=12)
Neonatal Survival Rate	91% (n=123)

The birth weight and Apgar score of the newborns ranged from 450-3500 grams (g) and 0 to 10, respectively. Perinatal mortality rates of the newborns were also coincided with their birth weights and Apgar scores. 18% (n=24) neonates were born weighing 1500g or below with Apgar scores of 0-10. Among this low birth weight babies, the rates of perinatal mortality were considerably higher compared to 82% (n=111) neonates weighing 1600-3500g with Apgar score of 4-10. Of the 24 babies born with1500g or below, 46% (n=11) could not survive and died during perinatal period in the hospital settings. Among the remaining 111 neonates with 1600-3500 birth weight and 4-10 Apgar score, only 1 neonate could not live and expired in Paediatrics Intensive Care Unit (PICU) (Table 5).

Table 5. Neonatal Outcome Among Different Birth Weight Neonates

Sample Percentage (Number of Patients)	Birth Weight	Neonatal Mortality
18% (n=24)	1500g or below	46%
82% (n=111)	1600-3500g	0.9%

Notably, the rates of neonatal deaths were considerably higher in twin pregnancies than those of singletons. Of the 9 twin pregnancies, 3 were ended in still-birth deliveries. Furthermore, in this study, 71% (n=96) newborns were admitted to Paediatric Intensive Care Unit (PICU), and 21% (n=20) among them were remained admitted for an extended period of 15-44 days in PICU settings. And the remaining 29% neonates (n=39) either did not require PICU admission at all or could not survive to be admitted in PICU.(Figure 3)

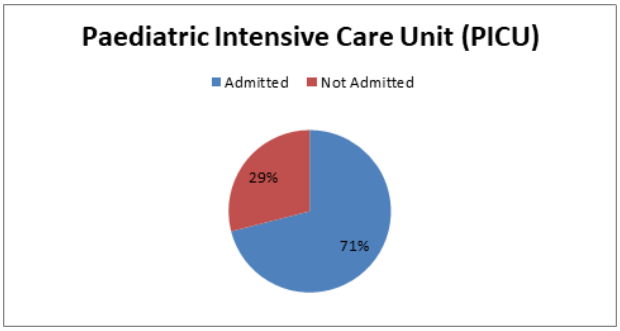

Figure 3. PICU Admissions

DISCUSSION

Preterm premature rupture of membranes (PPROM) is a common complication of pregnancy and a major cause of both maternal and neonatal morbidity and mortality. Around 3% of pregnancies are complicated by PPROM and is associated with approximately one third of all preterm births (Dinsmoor *et al.,* 2014; Kilpatrick *et al.,* 2006; Mercer, 2005). In the USA, approximately 1% of pregnancies from 16 to 26 completed weeks of gestation are being complicated by PPROM and associated with significant risk of neonatal morbidity and mortality (Nourse and Steer, 1997). In our study, the mean latent period was established to be 8 days, and similar duration was shown in Yang *et al* where the mean latent period was 8.6 days (Lee *et al.,* 2004), but this was not the case in previously conducted studies which showed much longer latency period of 18.6 days (Nourse and Steer, 1997; Moretti and Sibai, 1988; Vintzileos *et al.,* 1985; Vermillion *et al.,* 2000). Perhaps the reason for this shorter latency period could be consistent with the fact that a large number of patients were presented much later in their gestational age in this retrospective study, as was seen in Patil *et al* study. More the gestational age of the patients, shorter the latency period would be (Shweta Patil1 *et al.,* 2004). Much emphasis was placed on the rates of caesarean section in our study. 49% of the patients underwent caesarean section in this study which is comparable with the study conducted by Charles *et al* where the incidence of C-Section was found to be 58.7% (Charles *et al.,* 2005). However, the percentage of caesarean delivery in our study population was shown to be significantly higher than that reported in previous studies (Shehla Noor *et al.,* 2010; Tahir *et al.,* 2002). Probably such higher rates of caesarean section may be attributed to advanced surgical techniques and better prognosis than in the past. Maternal concentrations of CRP have been studied as an aid to diagnosing subclinical infection in pregnant women who experience PPROM and preterm labour (Dodds *et al.,* 1987; Yoon *et al.,* 1996). The current study showed moderately higher levels of CRP, and comparably higher rates of clinical chorioamnionitis (11%) and maternal pyrexia (18.5%) at the time of delivery compared to Artal K study and Patil *et al* where these rates were reported to be much lower for both maternal fever and clinical chorioamnionitis (Artal *et al.,* 1976). This high incidence of maternal infection may once again be due in part to occurrence of PPROM much later in their gestational period. In the present study, the rates of neonatal death were recorded at 9% which is consistent with Tavasseli *et al* and Patil *et al* which demonstrated 8.8% and 7% neonatal mortality rates in their studies, respectively (Fatemeh Tarassali *et al.,* 2010). However, these rates were significantly lower compared to study conducted by Moretti and Sibai in 1988, where perinatal mortality rates were reported to be as high as 67.7%. In addition, 47.9% neonatal death rates were illustrated in yang *et al* study, published in 2004. This positive neonatal outcome may be accredited to the consistent use of broad-spectrum antibiotics to treat neonatal sepsis, use of corticosteroids to enhance foetal lung maturation, prompt diagnosis of PPROM, and an improved maternal and neonatal care. Amon *et al* established that the use of prophylactic antibiotics could prolong the latency phase and reduce the incidence of neonatal infection, thus improving neonatal survival rates (Amon *et al.,* 1988).

The primary limitation of this retrospective study was the poor neonatal outcome of low birth weight babies. Despite having advanced neonatal care, the outcome remained dismal, as 46% of the neonates who weighed 1500g or below could not survive. The incidence of such high rates of neonatal mortality could possibly be associated with twin pregnancies. Among the 9 twin pregnancies, 3 were terminated in stillbirths before 26 completed weeks of gestation. While, on the contrary, much better 31.07% neonatal death rates in Perkins RP study (Perikins, 1982) and 33.3% in Patil *et al* were recorded in the same birth weight neonates. However, in our study, the occurrence of neonatal death were considerably be lower in newborns with birth weight of 1600g or above where only 1 (0.9%) neonatal death was witnessed compared to 5.5% in Perkin RP *et al* and 6.25% in Patil study with the same birth weight. Last but not least, 71% (n=96) newborns were admitted to PICU admissions soon after delivery. These rates were in accordance with previously conducted studies such as, Tanir *et al* study (2003) in which 75% and Hassan Boskabadi study where 65% (Hassan Boskabadi, 2011) neonates were admitted to PICU.

Conclusion

Overall, In spite of having immense improvements in the field of obstetrics, especially in neonatal care, the neonatal survival rate remained only moderately high and reported to be 91 % among patients whose pregnancies were complicated by PPROM. Also, the outcome was even worse when it comes to low birth weight babies (1500g or below), as the perinatal mortality rates were shown to be 46% among this study group. However, on the other hand, the maternal outcome of PPROM was reassuring, and no maternal death was reported in this retrospectively designed study. Although the rates of caesarean section were significantly higher, yet the maternal outcome was overwhelmingly positive in terms of maternal mortality rates. But even so, further studies of longer duration with much larger study population are needed to see the long-term implications of PPROM in both the newborns and the mothers.

REFERENCES

Allahyar Jazayeri, 2017. Premature Rupture of Membranes, Medscape. https://emedicine.medscape.com/article/261137-overview#a6

Amon E, Lewis SV, Sibai BM, Villar MA, Arheart KL. 1988. Ampicillin prophylaxis in preterm premature rupture of the membranes: a prospective randomized study. *Am J Obstet Gynecol.,* 159:539--543.

Artal K, Sokal RJ, Neuman M, Burstein AH, Stojkor J. 1976. The mechanical properties of prematurely and non-prematurely ruptured membranes. *Am J Obstet Gynecol.,* 125: 655-659.

Charles PJ, Muriel R, Charles PJ, Rene E, Oliver C, Pascal G, *et al*. 2005. A prospective population based study of 598 cases of PPROM between 24 and 34 weeks gestation: description, management and mortality (Dominos cohort). *Eur J Obstet Gynecol Reprod Biol.,* 121(2):164-70

Cushner IM, Mellitis D. 1972. *Obstet Gynecol Survey.,* 27: 94.

Dinsmoor MJ, Bachman R, Haney EI, Goldstein M, Mackendrick W. 2004. Outcomes after expectant management of extremely preterm premature rupture of the membranes. *Am J Obstet Gynecol.,* 190: 183–187.

Dodds W G. Ians J.D, 1987. Maternal CRP and Preterm Labour. *J Reported Med.,* (527-30).

Fatemeh Tarassali, Marzieh Ghareni, Ashraf Mohamadradi, Janislih Sharifian 2010. Survey of Pregnancy Outcome in PROM with AFI <5 & >5 OMT, 25: 118-123.

Gunn GC, Mishell DR, Morton DG. 1970. Premature of membranes, a review: *Am J Obstet Gynec.,* 106: 469.

Hassan Boskabadi, Gholamani Maamonei, Shahin MaFinejad, 2011. *Macedonian Journal of Medical Science*s, 15; 4(1): 93-98.

Kilpatrick SJ, Patil R, Connell J, Nichols J, Studee L. 2006. Risk factors for previable premature rupture of membranes or advanced cervical dilation: a case control study. *Am J Obstet Gynecol.,* 194: 1168–1174.

Lee C. Yang, DO; Donald R. Taylor, DO., Howard H. Kaufman, DO., Roderick Hume, MD., Byron Calhoun, 2004. Maternal and Fetal Outcomes of Spontaneous Preterm Premature Rupture of Membranes Original Contribution, JAOA, Vol 104, No 12.

Mercer B, Milluzzi C, Collin M. 2005. Periviable birth at 20 to 26 weeks of gestation: proximate causes, previous obstetric history and recurrence risk. Am J Obstet Gynecol., Sep. 193(3 Pt 2):1175-80.

Mercer BM. 2005. Preterm premature rupture of the membranes: current approaches to evaluation and management. *Obstet Gynecol Clin North Am.,* 32: 411–428.

Moretti M, Sibai BM. 1988. Maternal and perinatal outcome of expectant management of premature rupture of membranes in the midtrimester. *Am J Obstet Gynecol.,* 159:390-396.

Newton ER. 2005. Preterm labor, preterm premature rupture of membranes, and chorioamnionitis. *Clin Perinatol.,* 32: 571–600.

Nourse CB, Steer PA. 1997. Perinatal outcome following conservative management of mid-trimester pre-labor rupture of the membranes. *J Paediatr Child Health,* 33: 125-130.

Perikins RP. 1982. Neonatal significance of selected perinatal events among Infant of LBW-II. The influence of ruptured membranes. *Am J Obst Gynec.,* 142: 7.

Practice Bulletin No. 160: Premature Rupture of Membranes. *Obstet Gynecol*. 2016 Jan. 127 (1):e39-51.

Russell KP, Anderson GVT. 1962. The aggressive management of ruptured membranes. *Am J Obstet Gynecol.,* 83: 930-1962.

Shehla Noor, Ali Fawwad, Hasan Shahzad, Ruqqia Sullama, Rubina Bashir, 2010. Foetomaternal Outcome in patients with or without PROM. Journal Ayur Med. JAMC 22(1). Jan-Mar 2010

Shweta Patil1, Dr. Vikram Patil, 2014. Maternal and Foetal Outcome in Premature Rupture of Membranes, *IOSR Journal of Dental and Medical Sciences* (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 13, Issue 12 Ver. VII, PP 56-83.

Simhan HN, Canavan TP. 2005. Preterm premature rupture of membranes: diagnosis, evaluation and management strategies. *BJOG*, 112 Suppl 1:32-7.

Tahir S, Aleem M, Aziz K. 2002. Incidence of outcome of PROM. *Pak T Med Sci.,* 18(1): 26-32

Tanir HM, Sener T, Tekin N, Aksit A, Ardic N. 2003. PROM & Neonatal Outcome prior to 34 weeks of Gestation. *Int J Gynaecol Obstet.,* 82(2): 167-72

Vermillion, T, Kooba AM, Soper DE. 2000. Amniotic fluid index values after preterm premature rupture of the membranes and subsequent perinatal infection. *Am J Obstet Gynecol.,* 183:271-276.

Vintzileos AM, Campbell WA, Nochimson DJ, Weinbaum PJ. 1985. Degree of oligohydramnios and pregnancy outcome in patients with premature rupture of the membranes. *Obstet Gynecol.,* 66: 162-167.

Yoon BH, Jun JK Park, Kh, *et al*. 1996. Serum CRP, WBC Count in women with PPROM: *Obstetric Gynaecol.,* (1034-40).

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