ORIGINAL ARTICLE

Prevalence and Risk Factors of Preterm Premature Rupture of Membranes in Pregnant Women admitted to Hospital, Pakistan

MARYAM SHAHID[1], NOOR NISHAN[1], SHAFAQ SAEED FAROOQI[1], FARRAH JABEEN[2], HINA MANZOOR[2], SOHAIB ARIF[2]
[1]Senior Registrar, Department of Obstetrics and Gynaecology, The Indus Hospital. QF, NST & SMP Campus, Jubliee Town Lahore
[2]Senior Medical Officer, Department of Obstetrics and Gynaecology, The Indus Hospital. QF, NST & SMP Campus, Jubliee Town Lahore
Corresponding author: Sohaib Arif, Email: Shoaib.arif096@gmail.com

ABSTRACT

In both high- and low-income nations, preterm pre-labou membrane rupture is a significant contributor to perinatal, neonatal, and maternal illness and mortality. Premature membrane rupture puts a woman at risk for postpartum haemorrhage, intraamniotic infection, and even death. The purpose of this study was to ascertain the prevalence of preterm premature rupture of membranes and its related factors among pregnant women admitted to health institutions because little is known about the issue in the study region. A total of 300 participants participated in this research among which 100 had preterm PROM, 100 had PROM, and 100 had preterm deliveries. The ages of the participants ranged from 18-40 years with a mean age of 25.12 ± 4.43 years. Among 300 participants, 9.33, 17.33, 21, 24.33, and 28% were 18-20, 21-25, 26-30, 31-35, and 40 years of age, respectively. Among the total, 19 (6.33%), 271 (90.33%) and 10 (3.33%) were divorced, married and widowed, respectively. Among a total, 44, 40.33, and 15.66% of the participants were multigravida, primigravida, and grand-multigravida, respectively. The majority (87%) of mothers had ANC follow-up in their current pregnancy. In the large population, 255 (85%) had labor pain while 171 (578%) of mothers showed vaginal bleeding in the current pregnancy and 167 (55.67%) of mothers had cephalic presentation. 88.33% of pregnant women had no history of PROM. 97 (32.33%) of mothers had urinary tract infection in pregnancy, 32 (10.66%) had anaemia, and 41 (13.67%) had an abnormal vaginal discharge. The pregnant mothers had not used any cocaine, and cigarettes. Different risk factors associated with PPROM such as current urinary tract infection, gravidity, history of previous PPROM, preeclampsia, economic status, and anaemia were recorded. The major risk factors are use of smoking, chat, and cocaine. To lower the incidence of preterm premature rupture of membranes, early detection and treatment of urinary tract infections and atypical vaginal discharges were advised.
Keywords: Preterm prelabour rupture of membranes; fetal outcome; Female urogenital disorders; maternal age; Pakistan

INTRODUCTION

Preterm prelabour rupture of membranes (PPROM), which accounts for 30-40% of all preterm births, happens in 2.0-3.5% of pregnancies. PPROM is connected to preterm labour, prematurity, chorioamnionitis, and infections in the mother and the baby. According to reports, patients with PPROM have a higher rate of aberrant microbial colonization of the genital tracts than patients without PPROM; 32% to 35% of PPROM patients had positive amniotic-fluid cultures (Yeung et al., 2014; Yudin et al., 2017; Li et al., 2019; Tsakiridis et al., 2018). PPROM is connected to many risk factors. PPROM is more common in black people than in white patients. Other individuals who are more at risk are those with a lower socioeconomic standing, who smoke, have a history of STDs, have given birth prematurely in the past, have vaginal haemorrhage, or have uterine distension (e.g., polyhydramnios, multifetal pregnancy). Procedures like cerclage and amniocentesis have the potential to cause PPROM.

There doesn't seem to be a single cause of PPROM. PPROM may be brought on by choriodecidual infection or inflammation (Medina and Hill, 2006; Van Der Ham et al., 2012; Lorthe et al., 2017, 2018; Paramel Jayaprakash et al., 2016). According to positive amniotic fluid (AF) cultures or clinical signs of infection, 70% of PPROM cases are linked to intraamniotic infection (IAI). The question of whether infection causes or results from PPROM has been contested, though. Focal infection and inflammation may play a primary or secondary role in the aetiology of PPROM, according to histological and microbiological results (Goldenberg et al., 2008; Jamal and Srivastava, 2017). The impact of PPROM includes everything from maternal and newborn mortality and morbidity to national economic loss as a result of prescription costs, hospitalization, and absenteeism from employment, and cost to the medical community. Significant maternal complications caused by PPROM include puerperal infections, disseminated intravascular coagulopathy, placental abruption, surgical delivery, chorioamnionitis, and issues with mental health and lactation (Addisu et al., 2018; Pisoh et al., 2021). There is currently no reliable method of avoiding spontaneous rupture of the foetal membranes, making it impossible to control its occurrence. The best chance to avert the complications of PPROM would be through prediction and prevention. There is need to determine the prevalence, and risk factors associated with PPRM.

MATERIAL AND METHODS

Study area and design: A hospital-based cross-sectional study was conducted at the Department of Obstetrics and Gynaecology in Peshawar Medical College, Pakistan from January 2020 to April 2021. The Obstetrics and Gynaecology Department of the college has inpatient and outpatient services.

Study Population and data collection: The source population were all mothers who delivered in the hospital during the data collection period and their babies. Data were collected from mothers after their permission and included in the study. Different genres of literature were transformed and altered to create structured interviewer-administered data collecting forms. The information got from each mother through face to face interview. Sociodemographic data, previous and present obstetric and gynaecological history, medical history, and behavioural aspects were all grouped in the questionnaires. Medical records analysis and interviews of respondents were used to gather information for specific questionnaires given to respondents. Additional details on the delivery, the woman's health, and the baby's health were taken from the admission files of the mother and the child, if they were both hospitalized, and documented on the questionnaire. MUAC of each woman was also measured. All Preterm Premature Rupture of Membranes related information were asked from mothers and noted in the paper for further evaluation. The procedure of early researchers was adopted for data collection and study design (Workineh et al., 2018; Pisoh et al., 2021).

Data arrangement and statistical analysis: The collected information were entered into a computer and analyzed statistically using the programme Epi info version 7.2. Variables that were categorical were reported using frequencies and percentages.

RESULTS AND DISCUSSION

The current study was conducted in medical college of Peshawar, Pakistan to determine the prevalence of PPRM and associated risk factors. For this purpose, three hundred mothers who admitted in hospital were screened out with their consent approval. Some

mothers refused to take part in the current study, so those mothers excluded.

A total 300 participants were participated in this research among which 100 had preterm PROM, 100 had PROM, and 100 had preterm deliveries. The ages of the participants ranged from 18-40 years with a mean age of 25.12 ± 4.43 years. Among 300 participants, 9.33, 17.33, 21, 24.33, and 28% were in 18-20, 21-25, 26-30, 31-35, and 40 years of age, respectively. Among the total, 19 (6.33%), 271 (90.33%) and 10 (3.33%) were divorced, married and widowed, respectively (Table 1). Majority 109 (36.33%) of participants were illiterate, while only 22 (7.33%) had university level of education. It was noticed that majority (45.33%) of mothers were housewives followed by teacher (29%), merchant (17.66%), and others (students and labour) (8%). A study was designed by Pisoh et al. (2021), who reported that 34 participants had PROM, 57 had preterm deliveries and 19 had preterm PROM which is in line with our current study findings.

Table 1: Demographic characters of mother in the study area.

Variables	Frequency	%
Age (years)		
18-20	28	9.33
21-25	52	17.33
26-30	63	21
31-35	73	24.33
40	84	28
Total	300	100
Marital status		
Divorced	19	6.33
Married	271	90.33
Widowed	10	3.33
Total	300	100
Educational level		
Illiterate	109	36.33
Primary	54	18
Middle	49	16.33
Matric	39	13
FSC	27	9
University	22	7.33
Total	300	100
Social class		
Upper class	43	14.33
Middle class	78	26
Lower class	179	59.66
Total	300	100
Maternal occupation		
House wife	136	45.33
Teacher	87	29
Merchant	53	17.66
Other (labour, student)	24	8
Total	300	100
Residency		
Urban	126	42
Rural	173	57.66
Total	300	100
Religion		
Muslim	285	95
Christian	11	3.66
Hindu	4	1.33
Total		
MUAC	300	100
< 23 cm	165	55
> 23 cm	135	45
Total	300	100

According to Table 2, 44, 40.33, and 15.66% of the participants were multigravida, primigravida, and grand-multigravida, respectively. Numerous scientists had reached similar conclusions. The prevalence of PROM and preterm PROM among the 300 participants were 9.54 and 5.62%, respectively, whereas the proportion of PPROM was 35.48% of all preterm births. From 27 to 35 weeks was the gestational age at which PPROM occurred. Addisu et al. (2020) had reported 13.67%

prevalence of PPROM with CI= 10.6–17.2. The prevalence of PPROM was found to be 13.67% which is lower than our current study finding (Hackenhaar et al., 2014) who studied in Brazil and 2.01% by Byonanuwe et al. (2020) in India while Singh reported 7.5% in Uganda. 22.6% prevalence of PPROM had recorded in Ethiopia, while 2.01% in India, 3.1% in Brazil, 19.2% China and 7.5% in Uganda (Chandra and Sun, 2017; Mohan et al., 2017).

Table 2: Obstetric characteristics of the mothers in the study area.

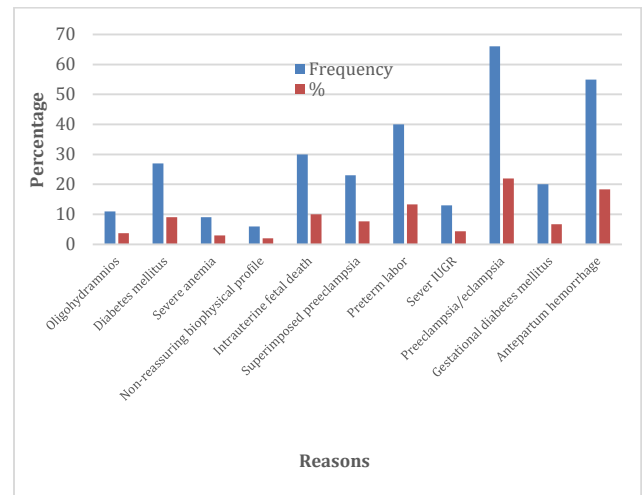| Variables	Frequency	%
Parity		
Nullipara	31	10.33
Primipara	126	42
Multipara	143	47.66
Total	300	100
Gravidity		
Primigravida	121	40.33
Multigravida	132	44
Grand-multigravida	47	15.66
Total	300	100
Type of Pregnancy		
Singleton	139	46.33
Multiple	161	53.66
Total	300	100

Figure 1: Major reasons of mother admission in hospital.

Table 3: Present and past obstetric characteristics of pregnant women.

Variables	Frequency	%
Gestational age		
29–33 weeks	128	46.33
34–36 weeks	172	53.66
Total	300	100
Vaginal bleeding in current pregnancy		
Yes	171	57
No	129	43
Total	300	100
History of preterm birth		
Yes	59	19.66
No	141	47
Total	300	100
Presentation		
Breech	89	29.66
Cephalic	167	55.67
Shoulder	44	14.7
Total	300	100
Polyhydramnios		
Yes	22	7.33
No	278	92.66
Total	300	100
Labor pain		
YES	255	85
No	45	15

Total	300	100
History of PROM		
Yes	35	11.66
No	265	88.33
Total	300	100
ANC follow-up		
Yes	261	87
No	39	13
Total	300	100

Table 3 shows the present and past Obstetrics-Related Characteristics of mothers. Majority (87%) of mothers had ANC follow-up in current pregnancy. The large population 255 (85%) had labor pain while 171 (578%) of mothers showed vaginal bleeding in current pregnancy and had 167 (55.67%) of mothers had cephalic presentation. 88.33% of pregnant women had no history of PROM. Our findings are dissimilar to the previous findings of researchers who reported only 7.1% of respondents had history of PROM. Many scientists had reported the similar results about PPROM from various countries (Vishwakarma et al., 2015; Emechebe et al., 2015; Idrisa et al., 2019).

Table 3: Behavioral and medical characters of pregnant mothers.

Variables	Frequency	Percentage
Urinary tract infection in current pregnancy	97	32.33
Gestational diabetes mellitus	21	7.00
Falling in accident	3	1.00
Anemia	32	10.66
Lifting heavy objects	68	22.66
Abnormal vaginal discharge	41	13.67
PPROM	87	29.00

Table 3 shows the behavioral and medical characters of mothers who admitted in hospital. It was recorded that 97 (32.33%) of mothers had urinary tract infection in pregnancy, 32 (10.66%) had anemia, and 41 (13.67%) had abnormal vaginal discharge. The current study findings are almost similar to the previous findings (Addisu et al., 2020; Gutema et al., 2022; Hackenhaa et al., 2014). They reported 20.3% UTI in pregnancy, 6.6% abnormal vaginal discharge, and 4.2% gestational diabetes mellitus. It was also observed that pregnant mothers had not used any cocaine, and cigarettes. There were different risk factors associated with PPROM such as current urinary tract infection, gravidity, history of previous PPROM, preeclampsia, economic status, and anemia. The major risk factors are use of smoking, chat, and cocaine. Grand multigravida influenced five times more primigravida while mothers having preeclampsia had three times

CONCLUSION
In the study location, PPROM is very common. Early detection, diagnosis, and treatment of preeclampsia and UTI are recommended to decrease PPROM. Abnormal vaginal discharge, UTI, vaginal bleeding during pregnancy, a history of prior PROM, and a mother's MUAC of less than 23 cm all have a tendency to facilitate PPROM. Consequently, pregnant women's nutritional status has improved. It is crucial to check for modifiable factors during antenatal care in order to prevent PPROM.

REFERENCES
1. Addisu, D., Asres, A., Gedefaw, G., & Asmer, S. (2018). Prevalence of meconium stained amniotic fluid and its associated factors among women who gave birth at term in Felege Hiwot comprehensive specialized referral hospital, North West Ethiopia: a facility based cross-sectional study. BMC pregnancy and childbirth, 18(1), 1-7.
2. Addisu, D., Melkie, A., & Biru, S. (2020). Prevalence of preterm premature rupture of membrane and its associated factors among pregnant women admitted in Debre Tabor General Hospital, North West Ethiopia: institutional-based cross-sectional study. Obstetrics and Gynecology International, 2020.
3. Byonanuwe, S., E. Nzabandora, B. Nyongozi et al., "Predictors of premature rupture of membranes among pregnant women in rural Uganda: a cross-sectional study at a tertiary teaching hospital," International Journal of Reproductive Medicine, vol. 2020, Article ID 1862786, 6 pages, 2020.
4. Chandra I, Sun L. Third trimester preterm and term premature rupture of membranes: is there any difference in maternal characteristics and pregnancy outcomes? Journal of the Chinese Medical Association. 2017;80(10):657 – 61.
5. Emechebe, C., C. O. Njoku, K. Anachuna, and U. Udofia, "Determinants and complications of pre-labour rupture of membranes (PROM) at the University of Calabar Teaching Hospital (UCTH), Calabar, Nigeria," Scholars Journal of Applied Medical Sciences, vol. 3, pp. 1912–1917, 2015.
6. Goldenberg, R. L., Culhane, J. F., Iams, J. D., & Romero, R. (2008). Epidemiology and causes of preterm birth. The lancet, 371(9606), 75-84.
7. Gutema, R. M., Dina, G. D., Berhanu, A., & Erena, M. M. (2022). Prevalence of Preterm Premature Rupture of Membrane and Associated Factors Among Pregnant Women Admitted To Health Facilities in Ambotown, Ethiopia, 2021.
8. Hackenhaar, A. A., E. P. Albernaz, and T. M. V. D. Fonseca, "Preterm premature rupture of the fetal membranes: association with sociodemographic factors and maternal genitourinary infections," Jornal de Pediatria (Versão em Portuguˆes), vol. 90, no. 2, pp. 197–202, 2014.
9. Idrisa, A., S. Pius, and M. Bukar, "Maternal and neonatal outcomes in premature rupture of membranes at University of Maiduguri Teaching Hospital, Maiduguri, North-Eastern Nigeria," Tropical Journal of Obstetrics and Gynaecology, vol. 36, no. 1, pp. 15–20, 2019.
10. Jamal, S., & Srivastava, R. (2017). A retrospective analytical study of the epidemiology and causes of preterm birth. Int J Reprod Contracept Obstet Gynecol, 6(12), 5453-5457.
11. Li, Y. Y., Kong, C. W., & To, W. W. (2019). Pathogens in preterm prelabour rupture of membranes and erythromycin for antibiotic prophylaxis: a retrospective analysis. Hong Kong Medical Journal, 25(4), 287.
12. Lorthe, E., Ancel, P. Y., Torchin, H., Kaminski, M., Langer, B., Subtil, D., ... & Kayem, G. (2017). Impact of latency duration on the prognosis of preterm infants after preterm premature rupture of membranes at 24 to 32 weeks' gestation: a national population-based cohort study. The journal of pediatrics, 182, 47-52.
13. Lorthe, E., Torchin, H., Delorme, P., Ancel, P. Y., Marchand-Martin, L., Foix-l'Hélias, L., & Kayem, G. (2018). Preterm premature rupture of membranes at 22–25 weeks' gestation: perinatal and 2-year outcomes within a national population-based study (EPIPAGE-2). American journal of obstetrics and gynecology, 219(3), 298-e1.
14. Medina, T. M., & Hill, D. A. (2006). Preterm premature rupture of membranes: diagnosis and management. American family physician, 73(4), 659-664.
15. Mohan SS, Thippeveeranna C, Singh NN, Singh LR. Analysis of risk factors, maternal and fetal outcome of spontaneous preterm premature rupture of membranes: a cross sectional study. Int J Reprod Contracept Obstet Gynecol. 2017;6(9):3781-7.
16. Paramel Jayaprakash, T., Wagner, E. C., van Schalkwyk, J., Albert, A. Y., Hill, J. E., Money, D. M., & PPROM Study Group. (2016). High diversity and variability in the vaginal microbiome in women following preterm premature rupture of membranes (PPROM): a prospective cohort study. PloS one, 11(11), e0166794.
17. Pisoh, D. W., Mbia, C. H., Takang, W. A., Djonsala, O. G. B., Munje, M. C., Mforteh, A. A., ... & Leke, R. J. I. (2021). Prevalence, Risk Factors and Outcome of Preterm Premature Rupture of Membranes at the Bamenda Regional Hospital. Open Journal of Obstetrics and Gynecology, 11(3), 233-251.
18. Singh, T. D., R. Usham, and H. Kamei, "Preterm prelabour rupture of membrane 1 year study," Journal of Evolution of Medical and Dental Sciences, vol. 4, no. 49, pp. 8495–8498, 2015.
19. Tsakiridis, I., Mamopoulos, A., Chalkia-Prapa, E. M., Athanasiadis, A., & Dagklis, T. (2018). Preterm premature rupture of membranes: a review of 3 national guidelines. Obstetrical & gynecological survey, 73(6), 368-375.
20. Van Der Ham, D. P., Van Der Heyden, J. L., Opmeer, B. C., Mulder, A. L., Moonen, R. M., van Beek, J. H. J., ... & Nijhuis, J. G. (2012). Management of late-preterm premature rupture of membranes: the PPROMEXIL-2 trial. American journal of obstetrics and gynecology, 207(4), 276-e1.
21. Vishwakarma, K., S. K. Patel, K. Yadav, and A. Pandey, "Impact of premature rupture of membranes on maternal & neonatal health in Central India," Journal of Evidence Based Medicine and Healthcare, vol. 2, no. 49, pp. 8505–8508, 2015.
22. Workineh, Y., Birhanu, S., Kerie, S., Ayalew, E., & Yihune, M. (2018). Determinants of premature rupture of membrane in Southern Ethiopia, 2017: case control study design. BMC research notes, 11(1), 1-7.
23. Yeung SW, Sahota DS, Leung TY. Comparison of the effect of penicillins versus erythromycin in preventing neonatal group B Streptococcus infection in active carriers following preterm prelabor rupture of membranes. Taiwan J Obstet Gynecol 2014;53:210-4.
24. Yudin MH, van Schalkwyk J, Van Eyk N. No. 233— Antibiotic therapy in preterm premature rupture of the membranes. J Obstet Gynaecol Can 2017;39:e207-12.