

Research Article
Open Access

Prevalence and Risk Factors to Premature Rupture Membrane through a Study in Jiblah University Hospital, Ibb, Governorate, Yemen

Afaf Alsharif^{1*}, Amal Molhi², Athar Alseneaa², Seham Mahdi², Ola Al-Mojammer², Nada Faisal², Ghidaa Alamar², Afaq Qaseem² and Abeer Rashed²

¹Assistant Professor of Obstetrics and Gynecology, Dean of the Faculty of Midwifery, Jableh University of Medical and Health Sciences, Yemen

²Bachelor's degree from Jiblah University of Medical and Health Sciences, Yemen

ABSTRACT

Background: Prelabour rupture of membranes (PROM), previously known as premature rupture of membranes, PROM occurs when the leakage of amniotic fluid occurs at least one hour before the initiation of labor. The fetal membranes normally rupture spontaneously during labor probably due to the physical effects of repetitive uterine contraction.

Objectives: As no studies have previously been conducted about PROM in Jiblah University Hospital in Ibb governorate, Yemen, we hereby aimed to present first report on prevalence and risks factors contributing and causes of PROM.

Methods: This retrospective observational study was conducted in the department of Obstetrics & Gynecology, Jiblah University Hospital in Ibb governorate, from December 2023 to Feb 2024. Data were retrieved from the antenatal ward admission register, case files, theatre records, and neonatal care unit records and reviewed. Descriptive statistics were used to describe data. Chi-square test with a significance level set at $p < 0.05$

Results: A total of 1350 women of reproductive age between 15 to 56 years were included in the study. With mean (\pm SD) age of the respondents was 27.5(\pm 6.3) years.

At the individual level, 627 (46.4%) of the respondents were 15 – 25 years old. At the household/community- level with 1063 (78.70%) of the study respondents resided in rural. About 640(47.40%) having more than 3 of family number. Nearly 1075 (79.60%) of them are literate. About 1234(91.40%) had normal blood pressure. Regarding cigarette smoking, 138 (10.20%) smokers and 1212 (89.80%) were non- smokers. Nine hundred and thirty- three (69.10%) of the khat chewing had a history of khat chewing during this pregnancy and 417 (30.90%) of the non-khat chewing. Eight hundred and seventy-two (64.59%) of the urinary tract infection during this pregnancy. On the other hand, all the individual and household/community factors were significantly associated with PROM are family number, vaginitis, urinary tract infection, duration of PROM, abortion where the chi square test p-value was < 0.05 .

Conclusion: In this study, a family number, vaginitis, urinary tract infection, duration of PROM, abortion are the risk factors for PROM. Recognizing the most common risk factors for PROM will help to increase the awareness about high-risk pregnancy, improve the preventive measures of preterm risk factors and modify preterm care protocol in nurseries.

*Corresponding author

Afaf Alsharif, Assistant Professor of Obstetrics and Gynecology, Dean of the Faculty of Midwifery, Jableh University of Medical and Health Sciences, Yemen.

Received: January 28, 2025; **Accepted:** January 31, 2025; **Published:** February 10, 2025

Keywords: PROM, Risk Factors, Infection, Jiblah

Materials and Methods

Design of the Study

This study was conducted retrospective observational study was conducted in the department of Obstetrics & Gynecology, Jiblah University Hospital in Ibb city, from December 2023 to February/2024. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and received approval from Jiblah University Ethics Research Committee (approval number: 167). Consent from the patients was waived off by the ethical committee of the institute because of the retrospective design of the study.

Study Population

Patients who were admitted in this hospital with gestational age 28 weeks and more with pre-labor premature rupture of membrane (PROM) confirmed by speculum examination and ultrasound for gestational age and amniotic fluid index (AFI), were included.

Data Collection

For data collection, the maternity records available in the hospital archive were used. The sampling method in this study was based on complete enumeration and all the records in the hospital archive were evaluated.

Cases were excluded from analysis for women lost to follow-up or with missing data. The hospital database including hospital information system (archive medical records), were used to collect the following data: socio-demographic characteristics, maternal obstetric and medical history, behavioral and nutritional characteristics, and fetal-related characteristics. However, maternal obstetric, medical, and fetal-related data that could not be addressed by interviews, such as gestational age, UTI, abnormal vaginal discharge, anemia, antepartum hemorrhage, gestational diabetes mellitus (GDM), PIH, fetal presentation, and polyhydramnios, were collected from patient's medical records and charts. The data were gathered in the labor and maternity wards of each selected hospital.

Data Analysis

Analysis was done using SPSS version 26 statistical software (IBM SPSS Statistics). Frequencies, percentages and descriptive statistics were computed to describe the demographic characteristics of respondents and outcome variable (mode of delivery). Chi square test was performed to examine the existence of a relationship between warty leaking and the independent variables. All independent variables that were statistically significant at P-value < 0.05.

Important of Study

Since the studies in our country on preterm pre rupture membrane in general are very minor and almost negligible, especially with regard to the high incidence of preterm pre rupture membrane among Yemeni women and at the same time the reasons behind this high prevalence at the level of the republic in general and the level of Ibb governorate in particular.

So, in the absence of previous studies here in Ibb City –Yemen, on Assessment and Investigation of Risk Factors for preterm pre rupture membrane rate among pregnant women, we were interested in doing such an important area of research.

Objectives

The main objective of this study is to assess the role of potential risk factors in the occurrence of preterm pre rupture membrane (PPRM) among pregnant women referred to Jiblah University Hospital in Ibb, Yemen. This may be achieved through attainment of the specific objectives as outlined below.

- To identify and understand the factors that contribute to development of preterm pre rupture membrane PPRM.
- To investigate the prevalence and risk factors of preterm pre rupture membrane in pregnant women referred to Jiblah University Hospital in Ibb, Yemen. To do the prevention for PROM.

Results

A total of 1350 pregnancies, 109 (8.10%) were PROM and a higher proportion of the pregnant women 1241 (91.9%) did not have PROM at Jiblah University Hospital, Ibb. The mean maternal age for these patients with pre-labor rupture of membranes (PROM) was 27.5 ±6.3 years. A higher proportion of the pregnant women with PROM 1063(78.70%) were in the age group from 15 – 25 years. At the household/community- level with1063(78.70%)of the study respondents resided in rural areas. About 640 (47.40%) having more than 3 of family number. Nearly1075 (79.60%) of them are literate. Regarding cigarette smoking, 138 (10.20%) are smokers and 1212 (89.80%) were nonsmokers. 933(69.10%) of the khat chewers had a history of khat chewing during this pregnancy and 417 (30.90%) of the non khat chewing. 872 (64.59%) of the urinary tract infection during this pregnancy. (Table 1)

Table 1: Baseline Characteristics of Subject Study

Variables		Count	Table N %
Pre-labor rupture of membranes	Yes	109	8.10%
	No	1241	91.90%
Duration of PROM	1	82	6.07
	2	17	1.26
	3	10	0.74
	4	1241	91.93
Age	15 to 25	627	46.40%
	26 to 36	594	44.00%
	37 to 47	125	9.30%
	48+	4	0.30%
family number	< 3	386	28.60%
	three	324	24.00%
	4+	640	47.40%
Residence	Rural	1063	78.70%
	Urban	287	21.30%
Education	literate	1075	79.60%
	illiterate	275	20.40%
Worker	Yes	1274	94.40%
	No	76	5.60%
Smoking	Yes	138	10.20%
	No	1212	89.80%

Chewing Kat:	Yes	933	69.10%
	No	417	30.90%
Urinary tract infection	Yes	872	64.59
	No	478	35.41
Uterine anomalies	Yes	74	5.48
	No	1276	94.52
Antepartum hemorrhages	Yes	12	0.89
	No	1338	99.11
Nutritional deficiencies of copper and ascorbic acid	Yes	74	5.48
	No	1276	94.52
Congenital anomalies for baby	Yes	12	0.89
	No	1338	99.11
Uterine overdistention	Yes	46	3.41
	No	1304	96.59
Multiple pregnancy	Yes	70	5.19
	No	1280	94.81
Preeclampsia, eclampsia	Yes	1236	91.56
	No	114	8.44
Antenatal care	Yes	1317	97.56
	No	33	2.44
Vaginal bleeding history in current pregnancy	Yes	74	5.48
	No	1276	94.52
History of cervical incompetence	Yes	74	5.48
	No	1276	94.52
Placenta abruption	Yes	12	0.89
	No	1338	99.11
Preterm labor	Yes	171	12.67
	No	1179	87.33
vaginitis	Yes	872	64.59
	No	478	35.41
Anemia	Yes	74	5.48
	No	1276	94.52

All the individual and household/community factors were significantly associated with PROM are family number, vaginitis, urinary tract infection, duration of PROM , abortion where the Chi squire test p-value were <0.05.

Table 2: Association between Socio-Demographic and Reproductive Characteristics and Watery Leaking

Variables		N	There are watery leaking				chi squire	pvalue
			Yes(109)		No(1241)			
			Count	Row N %	Count	Row N %		
Age	15 to 25	627	47	7.50%	580	92.50%	6.921	0.074
	26 to 36	594	58	9.80%	536	90.20%		
	37 to 47	125	4	3.20%	121	96.80%		
	48+	4	0	0.00%	4	100.00%		
	Mean ± Std=27.49±6.3							

Family numbers	< 3	386	43	11.10%	343	88.90%	6.933	0.031*
	Three	324	21	6.50%	303	93.50%		
	4+	640	45	7.00%	595	93.00%		
Residence	Rural	1063	84	7.90%	979	92.10%	0.199	0.655
	Urban	287	25	8.70%	262	91.30%		
Education	Literate	1075	85	7.90%	990	92.10%		
	Illiterate	275	24	8.70%	251	91.30%	0.199	0.656
worker?	Yes	1274	100	7.80%	1174	92.20%		
	No	76	9	11.80%	67	88.20%		
Smoking	Yes	138	13	9.40%	125	90.60%	0.375	0.54
	No	1212	96	7.90%	1116	92.10%		
Chewing Khat:	Yes	933	81	8.70%	852	91.30%	1.502	0.22
	No	417	28	6.70%	389	93.30%		
Preeclampsia, eclampsia	Yes	1236	100	8.10%	1136	91.90%	0.005	0.941
	No	114	9	7.90%	105	92.10%		
Antenatal care	Yes	1317	108	8.20%	1209	91.80%	1.159	0.28
	No	33	1	3.00%	32	97.00%		
Vaginal bleeding (history in current pregnancy)	Yes	74	10	13.50%	64	86.50%	3.121	0.077
	No	1276	99	7.80%	1177	92.20%		
History of cervical incompetence	Yes	74	10	13.50%	64	86.50%	3.121	0.077
	No	1276	99	7.80%	1177	92.20%		
Placenta abruption	Yes	12	1	8.30%	11	91.70%	0.001	0.974
	No	1338	108	8.10%	1230	91.90%		
Preterm labor	Yes	171	11	6.40%	160	93.60%	0.711	0.399
	No	1179	98	8.30%	1081	91.70%		
vaginitis	Yes	872	102	11.70%	770	88.30%	43.558	0
	No	478	7	1.50%	471	98.50%		
Anemia	Yes	74	10	13.50%	64	86.50%	3.121	0.077
	No	1276	99	7.80%	1177	92.20%		
Urinary tract infection	Yes	872	102	11.70%	770	88.30%	43.558	0
	No	478	7	1.50%	471	98.50%		
Uterine anomalies	Yes	74	10	13.50%	64	86.50%	3.121	0.077
	No	1276	99	7.80%	1177	92.20%		
Antepartum hemorrhages	Yes	12	1	8.30%	11	91.70%	0.001	0.974
	No	1338	108	8.10%	1230	91.90%		
Nutritional deficiencies of copper and ascorbic acid	Yes	74	10	13.50%	64	86.50%	3.121	0.077
	No	1276	99	7.80%	1177	92.20%		
Congenital anomalies for baby	Yes	12	1	8.30%	11	91.70%	0.001	0.974
	No	1338	108	8.10%	1230	91.90%		
Uterine overdistention	Yes	46	5	10.90%	41	89.10%	0.501	0.479
	No	1304	104	8.00%	1200	92.00%		
Multiple pregnancy	Yes	70	6	8.60%	64	91.40%	0.025	0.875
	No	1280	103	8.00%	1177	92.00%		
Premature rupture of membrane	one	82	82	100.00%	0	0.00%	1350	0
	Tow	17	17	100.00%	0	0.00%		
	three	10	10	100.00%	0	0.00%		
	Four	1241	0	0.00%	1241	100.00%		
Abortion number	0 to 1	1225	93	7.60%	1132	92.40%	4.145	0.042
	2+	125	16	12.80%	109	87.20%		

Gravity numbers	one	420	38	9.00%	382	91.00%	3.911	0.271
	2 to 4	617	44	7.10%	573	92.90%		
	5 to 8	264	20	7.60%	244	92.40%		
	9+	49	7	14.30%	42	85.70%		
parity numbers	no	459	44	9.60%	415	90.40%	4.092	0.252
	1 to 4	746	51	6.80%	695	93.20%		
	5 to 8	140	14	10.00%	126	90.00%		
	9+	5	0	0.00%	5	100.00%		

Discussion

Pre-labor rupture of membrane defined as the rupture of fetal membranes before the beginning of uterine contractions, is a common complication of pregnancy and the leading cause of preterm birth. In Jiblah University Hospital in Ibb city, the prevalence of pre-labor rupture of membrane varied significantly between settings due to variations in risk factors. Besides, there was no study conducted using primary data, particularly in the Jiblah University Hospital in Ibb, city.

Therefore, this study aimed to identify determinants of prelabor rupture of membrane among pregnant women attending in the Jiblah University Hospital, Ibb governorate. Our study presents the first report on PROM at the level of Ibb governorate and the two report at the level of Yemen, according the reported by [1].

This study investigated the pattern of pre-labor rupture of membranes in pregnancies and associated factors showing a prevalence of 8.10% of PROM among pregnant women above 28 weeks of gestation admitted at Jiblah University Hospital, Ibb governorate. This prevalence agreement with studies at Al-Sadaqa Teaching Hospital, Aden; this a prevalence of 11.1% of PROM among pregnant women above 28 weeks of gestation and reported within the worldwide range of 5 to 15% as reported by The prevalence of TPROM in this study was 10.4%, higher than that reported in the same hospital of 3.75% ,and in USA (8.0%). Ethiopia (1.4%) [2-4].

The prevalence of preterm premature rupture of the membranes (PPROM) was similar between developed countries and developing countries: China (2.5%) Pakistan (3.27%), (Obi, S. N.2007) Nigeria (2.5%) [5]. Another study in Turkey reported a high prevalence of PPRM (43.14%) [6]. The low prevalence documented in this study (0.7%) is quite difficult to clarify at this current time. The accuracy of the diagnosis of rupture membranes and estimation of gestational age may probably be other variables that may affect the apparent prevalence of PPRM.

As a result, family number, abnormal vaginal infection, urinary tract infection, duration of watery leaking, abortion were independent predictors of PROM.

A prior history of abortion was predictor of PROM identified in the current study. In agreement with this result, different studies conducted in Mekelle, Southern and Nekemte, Ethiopia, Uganda, Egypt, Iran, and China reported that a prior history of abortion was associated with the incidence of PROM. The possible reason might be the risk of intraamniotic infection developing from latent upper genital tract infections in a mother who had a prior history of unsafe abortions without getting proper post abortion care using aseptic techniques [7-13]. In addition, pregnant mothers with two or more abortions probably had a short cervical length, which

raised the incidence of PROM [14]. As a result, women with a history of abortion need to be sensitized by all the attending health professionals on the risk of PROM and advised on the need for close monitoring during their subsequent pregnancies.

In contrast in our study, a study carried out in Thailand found that a previous history of abortion had no statistically significant association with PROM [15]. The discrepancy might be due to the exclusion criteria of the study participants. Similar to our study, women with a gestational age of less than 37 weeks and mal presentation of fetus were excluded from Thailand's study. Moreover, women who had a previous history of abortion might have received post abortion care with aseptic techniques in Thailand.

On the other hand, this study participants who developed UTI were found to have higher significantly associated with PROM. Similarly, different studies conducted in Debre Tabor, Ethiopia, Uganda, Cameroon, and India found that UTI was an independent determinant of PROM [16,17]. This could be due to the fact that bacterial infections in the urinary tract ascend through the vaginal and cervical canals into the decidua and fetal membrane, which ultimately leads to the release of prostaglandin and cytokines, thereby causing the cervix to soften and become more susceptible to ascending infections, resulting in PROM. Also, the direct release of bacterial proteolytic enzymes such as proteases, collagenases, or trypsin may cause fetal membrane damage, weakness, and subsequent rupture. Therefore, healthcare providers should screen pregnant mothers for UTI and treat all mothers with UTI during ANC visits.

The present study also revealed that abnormal vaginal infection was identified as a determinant of PROM. This finding is in agreement with studies conducted in Debre Tabor and Mekelle, Ethiopia, Nigeria, Cameroon, Togo and India [18-20]. The association might be explained by the presence of various microorganisms in the genital tract that proliferate and invade the amniotic fluid and fetal membranes, leading to PROM. Simultaneously, intra-amniotic infection may increase the activity of the uterus, leading to increased intra-uterine pressure, which in turn puts greater stress on the fetal membranes, resulting in weakness and PROM [21]. Thus, healthcare providers should emphasize early screening, diagnosis, and treatment of abnormal vaginal discharge.

In contrast to our study, a population-based study conducted in Brazil showed that there was no association between genitourinary infections and PROM [22]. This difference might be due to a study done in Brazil that used a larger sample size, a cross-sectional study design, and the exclusion of term pregnant women. Also, it may be attributed to the self-reported and early treatment of these infections by most women in the Brazilian study.

Maternal khat chewing was not identified as one of the determinants of PROM in the present study. Pregnant women who chewed khat had no statistically significant of developing PROM than their counterparts in this pregnancy. In contrast to our study, cross-sectional studies carried out in Eastern Ethiopia and Yemen reported that khat chewing was significantly associated with PROM [23,24]. This could be because khat by itself was found to cause loss of appetite and decreased absorption of nutrients in the gastrointestinal tract, which in turn decreased the availability of micronutrients essential for the strength of the fetal membrane collagen. The possible justification might also be that a woman who chewed khat had a higher risk of periodontal disease, as reflected by poor oral hygiene, calculus deposits, gingival pigmentation, and tooth loss [25]. Evidence from various studies showed that periodontal disease had an increased risk of the occurrence of PROM [26]. The possible reasons might be due to the dissemination of oral pathogens/byproducts and inflammatory mediators via the blood stream into the placenta, fetal circulation, amniotic fluid, and fetal membrane [27]. Therefore, it is important to increase awareness regarding the negative aspects of khat chewing during pregnancy.

The present study also revealed that multiple bimanual vaginal examinations was identified as a determinant of PROM. This finding is in agreement with studies conducted by ACOG Committee on Practice Bulletins-Obstetrics. It is found that the Chorioamnionitis is seen more commonly in women with prolonged preterm PROM, severe oligohydramnios, multiple vaginal examinations, and preterm PROM at an early gestational age.

In this study, PIH was not identified as a determinant of PROM. Pregnant women who had PIH had no statistically significant of developing PROM than their counterparts. This finding is in disagreement with the studies carried out in Southern Ethiopia, Uganda and China [28-30]. It is evident that in PIH, the initiating event is an abnormal or shallow cytotrophoblast invasion of spiral arterioles with insufficient uteroplacental blood flow. This result in an ischemic placenta, which leads to vascular endothelial cell activation by increasing the release of inflammatory cytokines or cell mediators that cause inflammation in the body [31-64].

Conclusion and Recommendations

Conclusion

In this study, a family number, vaginitis, urinary tract infection, PROM and abortion are the risk factors for PROM. Recognizing the most common risk factors for PROM will help to increase the awareness about high-risk pregnancy, improve the preventive measures of preterm risk factors and modify preterm care protocol in nurseries.

Recommendations

In the light of the results reached to our study represented in the factors contributing to PROM through a study at Jiblah University Hospital, we were able to make a set of the following recommendations:

- We recommend that the hospital should improve the patients, records and registration in the hospital.
- We recommend that the hospital should establish a center for registration, management and follow up the patients with PROM.
- We recommend that the hospital record patients' date should be in an integrated manner.
- We recommend that the hospital should perform laboratory

tests and diagnosis of histological features and outcomes in women with PROM.

- We recommend that women should undergo health care before pregnancy.
- Continued research is needed to better understand the causes of preterm labor and develop more PROM effective prevention and treatment strategies. By implementing these recommendations, we can work towards reducing the incidence of PROM and improving the health outcomes for mothers.

Conflict of Interest

There are no conflicts of interest with other people, organizations or entities

Acknowledgment

I acknowledge that this research is not sponsored or funded by any entity or person and has no financial purpose or return. It is a personal work

References

1. Ba-Deeb SS (2005) Analysis of prelabor rupture of membranes at term in Al-Wahda Teaching Hospital, Aden A Thesis for master degree in obstetrics and gynecology, faculty of medicine and health sciences, University of Aden.
2. Kuba, Kfier, Bernstein, Peter S (2018) ACOG Practice Bulletin Prelabor Rupture of Membranes, *Obstetrics & Gynecology* 131: 1163-1164.
3. Sultana S, Ishtiaq S, Malik U, Akhai AZ, Nadeem K (2019) Maternal and perinatal outcome in preterm prelabor rupture of membranes. *Pak J Surg* 35: 73-77.
4. Assefa N, Berhe H, Girima F, Berhe K, Berhe YZ, et al. (2018) Risk factors of premature rupture of membranes in public at Mekele city. *BMC Pregnancy and Childbirth* 18: 386-403.
5. Kalafat E, Yuce T, Tanju O, Koc A (2016) Preterm premature rupture of membranes assessment via trans-perineal ultrasonography: a diagnostic accuracy study. *J Maternal fetal Neonatal Med* 29: 3690-3694.
6. Woyessa TB, Fulea LG, Wakgari A (2020) Premature rupture of membrane and its associated factors among pregnant women admitted to public hospitals in Nekemte town, western Ethiopia. *International Research Journal of Obstetrics and Gynecology* 3: 27.
7. Habte A, Dessue S, Lulas K (2021) Determinants of premature rupture of membranes among pregnant women admitted to public hospitals in southern Ethiopia, 2020. A hospital based case - control study. *Medicine international Journal of women's Health* 12: 613-616.
8. Emara MH (2020) Effect of threatened abortion on fetal growth and premature rupture of membranes. *AlAzhar International Medical Journal* 1: 76-80.
9. Byonanuwe S, Nzabandora E, Nyongozi B, Ssebuufu R, Pius T, et al. (2020) Predictors of premature rupture of membranes among pregnant women in Rural Uganda: A cross sectional study at a tertiary teaching hospital. *Int J Reprod Med* 1862786.
10. Alijani L, Mosadegh H, Saremi AT (2017) Maternal Risk Factors of Premature Rupture of Membrane (PROM) after 37 Weeks of Pregnancy. *Sarem Journal of Medical research* 2: 9-12.
11. Zhou Q (2014) Risk factors for preterm premature rupture of membranes in Chinese women from urban cities. *Int J Gynaecol Obstet* 127: 254-259.
12. Gabbe SG, Niebyl JR, Simpson JL, Landon MB, Galan HL,

- et al. (2007) Obstetrics: normal and problem pregnancies. 5th ed. Philadelphia: Churchill Livingstone.
13. Lee SM, Park KH, Jung EY, Jang JA, Yoo HN (2017) Frequency and clinical significance of short cervix in patients with preterm premature rupture of membranes. *PLoS One* 12: e0174657.
 14. Kovavisarath E, Sermak P (2000) Risk factors related to premature rupture of membranes in term pregnant women: a case-control study. *Australian and New Zealand Journal of Obstetrics and Gynaecology* 40: 30-32.
 15. Pisoh DW, Mbia CH, Takang WA, Djonsala OG, Munje MC, et al. (2021) Prevalence, risk factors and outcome of preterm premature rupture of membranes at the Bamenda Regional Hospital. *Open Journal of Obstetrics and Gynecology* 11: 233-251.
 16. Lawan ZM, Bako B, Idrisa A, Bukar M, Gadzama GB (2019) Risk factors of prelabor rupture of membranes at University of Maiduguri Teaching Hospital, Maiduguri: A cross-sectional study. *Tropical Journal of Obstetrics and Gynaecology* 36: 293-298.
 17. Obi SN, Ozumba BC (2007) Pre-term premature rupture of fetal membranes: The dilemma of management in a developing nation. *Journal of Obstetrics and Gynaecology* 27: 37-40.
 18. Salou M, Lack F, Adama-Hondegla AB, Dossim S, Tsogbale N, et al. (2015) Premature rupture of the membranes at the Sylvanus Olympio University Hospital of Lome', Togo: Microbiological findings and outcomes. *Am J Infect Dis Microbiol* 3: 152-156.
 19. Karat C, Madhivanan P, Krupp K, Poornima S, Jayanthi NV, et al. (2006) The clinical and microbiological correlates of premature rupture of membranes. *Indian journal of medical microbiology* 24: 283-285.
 20. Caughey AB, Robinson JN, Norwitz ER (2008) Contemporary diagnosis and management of preterm premature rupture of membranes. *Rev Obstet Gynecol* 1: 11-22.
 21. Hackenhaar AA, Albernaz EP, Fonseca T (2014) Preterm premature rupture of the fetal membranes: association with sociodemographic factors and maternal genitourinary infections. *Jornal de pediatria* 90: 197-202.
 22. Yadeta TA, Egata G, Seyoum B, Marami D (2020) Khat chewing in pregnant women associated with prelabor rupture of membranes, evidence from eastern Ethiopia. *Pan African Med Journal* 36: 1.
 23. Abdel-Aleem M (2015) Khat chewing during pregnancy: an insight on an ancient problem. Impact of chewing Khat on maternal and fetal outcome among Yemeni pregnant women. *J Gynecol Neonatal Biol* 1: 1-4.
 24. Kalakonda B, Al-Maweri SA, Al-Shamiri HM, Ijaz A, Gamal S, et al. (2017) Is Khat (*Catha edulis*) chewing a risk factor for periodontal diseases? A systematic review. *Journal of clinical and experimental dentistry* 9: e1264.
 25. Vogt M, Sallum AW, Cecatti JG, Morais SS (2010) Periodontal disease and some adverse perinatal outcomes in a cohort of low risk pregnant women. *Reprod Health* 7: 1-7.
 26. Madianos PN, Bobetsis YA, Offenbacher S (2013) Adverse pregnancy outcomes (APO s) and periodontal disease: pathogenic mechanisms. *Journal of clinical periodontology* 14: S170-180.
 27. 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: 1-7.
 28. Kaya D (2001) Risk factors of preterm premature rupture of membranes at Mulago hospital Kampala. *East African medical journal* 78: 65-69.
 29. Liu L, Wang L, Yang W, Ni W, Jin L, et al. (2019) Gestational hypertension and pre-eclampsia and risk of spontaneous premature rupture of membranes: A population-based cohort study. *International Journal of Gynecology & Obstetrics* 147: 195-201.
 30. Granger JP, Alexander BT, Llinas MT, Bennett WA, Khalil RA (2001) Pathophysiology of hypertension during preeclampsia linking placental ischemia with endothelial dysfunction. *Hypertension* 38: 718-722.
 31. ACOG (2007) Practice Bulletin premature rupture of membranes. *Clinical management guideline for obstetrician-gynecologists* 109: 1009-10019.
 32. 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. *Obstet. Gynecol. Int* 14: 4034680.
 33. Al-Kaaky NS (2022) Prevalence of the pattern of Pre-labor premature rupture of membranes among pregnant women at Al-Sadaqa Teaching Hospital, Aden, Yemen., Faculty of Medicine & Health Sciences , Aden University . Yemen., *Journal of Medical & Pharmaceutical Sciences* 6: 52-65.
 34. (1998) American College of Obstetricians and Gynecologists. *Premature Rupture of Membranes*. Washington, DC: American College of Obstetricians and Gynecologists; Practice Bulletin.
 35. Birkedal-Hansen H (1995) Proteolytic remodeling of extracellular matrix. *Curr Opin Cell Biol* 7: 728.
 36. Bond DM, Middleton P, Levett KM, Ham DP, Crowther CA, et al. (2017) Planned early birth versus expectant management for women with preterm prelabour rupture of membranes prior to 37 weeks' gestation for improving pregnancy outcome. *Cochrane Database of Systematic Reviews* DOI: doi.org/10.1002/14651858.CD004735.pub4.
 37. Clark EA, Varner M (2011) Impact of preterm PROM and its complications on long-term infant outcomes. *Clin Obstet Gynecol* 54: 358-369.
 38. Dammann O, Leviton A, Gappa M, Dammann CE (2005) Lung and brain damage in preterm newborns, and their association with gestational age, prematurity subgroup, infection/inflammation and long term outcome *BJOG* 112: 4-9.
 39. Emarah MH (2020) Effect of threatened abortion on fetal growth and premature rupture of membranes. *AlAzhar International Medical Journal* 1: 76-80.
 40. Enkin M, Keirse, Marc, Neilson J, Crowther (2000) *Guide to effective care in pregnancy and child birth*, 3rd ed. Oxford England: Oxford University Press DOI: 10.1093/med/9780192631732.001.000.
 41. Goldenberg RL, Culhane JF, Iams JD, Romero R (2008) Epidemiology and causes of preterm birth. *Lancet* 371: 75-84.
 42. Habte A, Dessue S, Lulas K (2021) Determinants of premature rupture of membranes among pregnant women admitted to public hospitals in southern Ethiopia, 2020. A hospital based case - control study. *Medicine international Journal of women's Health* 12: 613-616.
 43. Hannah ME, Ohlsson A (1996) Induction of labor compared with expectant management for prelabor rupture of the membranes at term *N Eng J Med* 334: 1005-1010.
 44. Iams JD, Gabbe SG, Niebyl JR, Simpson JL (2002) *Premature rupture of membranes*. In :. 4th ed Philadelphia USA : Churchill Livingstone 804-811.
 45. Kenyon S, Boulvain M, Neilson J (2001) Antibiotics for

- preterm premature rupture of membranes. *Cochrane Database Syst Rev* CD 001058.
46. Kumar D, Moore RM, Mercer BM (2016) The physiology of fetal membrane weakening and rupture: Insights gained from the determination of physical properties revisited. *Placenta* 42: 59.
 47. Lannon SM, Vanderhoeven JP, Eschenbach DA, Gravett MG, Waldorf KM (2014) A. Synergy and interactions among biological pathways leading to preterm premature rupture of membranes. *Reprod* 21: 1215-1227.
 48. Lemons JA, Bauer CR, Oh W, Korones SB, Papile LA, Stoll BJ, et al. (2001) Very low birth weight outcomes of the National Institute of Child Health and human development neonatal research network, January 1995 through December 1996. NICHD neonatal research network. *Pediatrics* 107: E1
 49. Liu JFeng, ZCWu J (2010) The incidence rate of premature rupture of membranes and its influence on fetal-neonatal health: a report from mainland China. *J Trop Pediatr* 56: 36-42.
 50. Mercer BM (2003) Preterm premature rupture of the membranes. *Obstet Gynecol* 101: 178-193.
 51. Moore RM, Mansour JM, Redline RW, Mercer BM, Moore JJ (2006) The physiology of fetal membrane rupture: insight gained from the determination of physical properties. *Placenta* 27: 1037-1051.
 52. Ngai SB (2014) Premature rupture of the fetal membrane combined with subclinical chorioamnionitis negatively affects pregnancy outcomes by a mechanism associated with reduced levels of matrix metalloproteinase-2. *Placenta* 35: 645-651.
 53. Noor S, Nuzar AF, Sultan R, Bashir R (2007) Prevalence of PPRM and its outcome. *J. Ayub Med Coll Abbottabad* 19: 7-14.
 54. Onwughara CE, Moodley D, Valashiya N, Sebitloane M (2020) Preterm prelabour rupture of membranes (PPROM) and pregnancy outcomes in association with HIV-1 infection in KwaZulu-Natal, South Africa. *BMC Pregnancy Childb* 20: 1-8.
 55. Parry E (2006) Managing PROM and PPRM. *Obstetrics & Gynecology* 8: 35-38.
 56. Ramsauer B, Vidacff AC, Hösli I (2013) The diagnosis of rupture of fetal membranes (ROM): a meta-analysis. *J Perinat Med* 41: 233.
 57. Rashmi PA (2016) Oxytocin and oral misoprestol for labor induction in prelabour rupture of membranes. *Int J Reprod contracept obstet Gynecol* 5: 379-383.
 58. Reuter S, Moser C, Baack M (2014) Respiratory distress in the newborn. *Pediatr Rev* 35: 417-428.
 59. Romero R, Brody DT, Oyarzum E, Mazor MWuYK, Hobbins, et al. (1989) Infection and labor, III: interleukin-1: a signal for the onset of parturition. *Am J Obstet Gynecol* 160: 1117-1123.
 60. Seema M, Mamta J (2017) Premature rupture of membrane-risk factors : a clinical study. *International Journal of Contemporary Medical Research* 4: 146-148.
 61. Shree R, Caughey AB, Chandrasekaran S (2018) Short interpregnancy interval increases the risk of preterm premature rupture of membranes and early delivery. *J. Matern.-Fetal Neonatal Med* 31: 3014-3020.
 62. Tc O (2014) Te incidence and management outcome of preterm premature rupture of membranes (PPROM) in a tertiary hospital in Nigeria. *Am. J. Clin. Med. Res* 2: 14-17.
 63. Wen CC, Yockey LJ (2017) Complications of pregnancy: premature rupture of membranes, chorioamnionitis, amnioinfusion, prenatal administration of surfactant. *MedCrave online journal of obstetrics and gynecology* 5: 152-157.
 64. Zhou Q, Zhang W, Xu H, Liang H, Ruan Y, et al. (2014) Risk factors for preterm premature rupture of membranes in Chinese women from urban cities. *International Journal of Gynecology & Obstetrics* 127: 254-259.

Copyright: ©2025 Afaf Alsharif, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.