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Prevalence of Preterm Premature Rapture of Membrane and Associated Factor Among Pregnant Mother Admitted to Labor Ward, Adama, Oromia Region, Ethiopia

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Abstract: Preterm premature rupture of membranes is as rupture of membranes before 37 weeks gestational age. It is a common complication of pregnancy associated with significant maternal, fetal and neonatal morbidities and moralities. An understanding of is critical in providing appropriate Intervention to prevent poor pregnancy outcomes. Therefore this study assessed the prevalence of preterm premature rupture of membranes and associated factor among pregnant mothers admitted at Adama Hospital Medical College labor and delivery ward, Oromia regional state, Ethiopia 2022. *Methods:* Facility based cross-sectional study design was employed among 211 pregnant women who were come for labor and delivery at Adama hospital medical college town and study participant were selected by systematic Random sampling technique. Data was collected by trained data collectors using semi structured and pretested questionnaires. The collected data were coded and entered in to Epi info version 7 and exported to SPSS version 20 for cleaning and analysis. Descriptive statistics was used to summarize socio demographic characteristics, reproductive health related data and to describe magnitude of service satisfaction. Bivariate and multivariate logistic regression models were used to determine the associated factors. *Result:* The prevalence of preterm premature rupture of membrane was 13.3%. About having history of STI (AOR: 2.61, 95% Cl: 1.4, 4.7), abnormal vaginal discharge (AOR: 3.04, 95% CI: 1.6.5.7) and having history of PROM (AOR: 3.8, 95% Cl: 2.02-7.3) were factors associated with preterm premature rupture of membranes.

Keywords: Prevalence, Preterm Premature Rupture of Membrane, Risk Factors, Pregnant Mother, Adama Town, Ethiopia

1. Introduction

Amniotic fluid is fluid that surrounds the fetus after the first week of gestation and the main source amniotic is fluid fetal urination. However, passage across the fetal. Membranes, across the skin, and across the umbilical cord, as well as fetal saliva production and fetal pulmonary effluent also contribute. Amniotic fluid protects against infection, fetal trauma, and umbilical cord compression. It also allows for fetal movement and fetal breathing, which, in turn, permits fetal lung, chest, and skeletal development. Decreased or absence of amniotic fluid can lead to compression of the umbilical cord and decreased placental blood flow. Disruption (rupture) of the fetal membranes is associated with loss of protective effects and developmental roles of amniotic fluid [1].

Membrane rupture that occurs spontaneously after 28wks to one hour before onset of labor described as premature rupture of membrane. Rupture of the membranes regardless of the gestational age at which it occurs rupture of membrane complicates about 8% to 10% of pregnancies [2].

Preterm premature rupture of membranes (PPROM) is defined as rupture of membranes before 37 weeks GA; Preterm premature rupture of membrane is a complication of approximately 1/3 of all preterm births Within 1 week is the most likely outcome for any patient with PPROM in the absence of adjudicative treatments. The earlier in gestation

PROM Occurs the longer the latency period (time between PROM and delivery Outcomes of survivors of preterm PROM depend on GA, presence of infection, length of latency, and other maternal and fetal complications [3].

The diagnosis PROM is adequately made by a history suggestive of spontaneous rupture of membranes (SROM) followed by a sterile speculum examination. Demonstrating pooling of fluid in the posterior vaginal fornix, Ultrasound examination demonstrating oligohydramnios is also useful in helping to confirm the diagnosis of spontaneous rupture of the membranes; however, a normal amniotic fluid index on ultrasound does not exclude the diagnosis of PPROM [4]. Preterm PROM is one of the major factors that have been found to correlate with adverse pregnancy outcomes. It remains a critically important clinical and public health problem. The fetal membranes serve as a barrier to ascending infection. Once the membranes rupture, both the mother and fetus are at risk of infection and of other complications [5].

Each year, about 15 million babies in the world, more than one in 10 births, are born too prematurely. More than one million of those babies die shortly after birth; countless others suffer from lifelong physical, neurological, or educational disabilities, often at great cost to families and societies. Complications of preterm birth are the leading direct causes of neonatal mortality and account for an estimated 27% of neonatal deaths. PPROM is a leading cause of preterm delivery with a third of all preterm births resulting from preterm PROM. This comes to almost four million neonatal deaths every year [6].

Worldwide, in 2018 an estimated 303000 women died due to maternal related causes. Almost all of these maternal deaths around 99% occurred in low and middle income countries, with two thirds (64%) taking place in developing countries like Sub- Saharan Africa [7].

Premature rupture of membrane is the common complication of pregnancy which is an important cause for prenatal and maternal morbidity and mortality [8]. Preterm premature rupture of membrane (PPROM) occurs in 3 percent of pregnancies and associated with around one third of preterm births, while term premature rupture of membrane complicates approximately about 8-10% of all pregnancies globally [9].

The incidence of PROM ranges from about 5% to 10% of all deliveries, and PPROM occurs in approximately 1% of all pregnancies. Approximately 70% of cases of PROM occur in pregnancies at term, but in referral centers, more than 50% of cases may occur in preterm pregnancies [10].

Neonatal complications relate primarily to the gestational age at rupture of membranes. Preterm PROM is associated with a 4 folds increase in prenatal mortality and a 3 folds increase in neonatal morbidity, including respiratory distress syndrome (RDS), which occurs in 10% to 40% of women with PPROM and is responsible for 40% to 70% of neonatal deaths; poly microbial intra amniotic infection, which occurs in 15% to 30% of women with PPROM and accounts for 3% to 20% of neonatal deaths and intra ventricular hemorrhage [11].

Other neonatal complications include fetal pulmonary hyperplasia, skeletal deformities, which complicate 12% of preterm PROM, related to severity and duration of preterm PROM; cord prolapsed, especially in pregnancies with a non vertex presentation; and increased cesarean delivery formal-presentation. Severe oligohydramnios in the setting of preterm PROM results in an increased incidence of cord compression and non-reassuring fetal testing (fetal distress) in labor, leading to a further increase in the risk of cesarean delivery. Preterm PROM and exposure to intrauterine inflammation/infection have been associated with an increased risk of neuron developmental impairment. Infection, cord accident, and other factors contribute to the 1% to 2% risk of intrauterine fetal demise (stillbirth) after preterm PROM [12].

Maternal complications include clinically evident intro-amniotic infection, which occurs in 13% to 60% of women with preterm PROM as compared with 1% at term, and postpartum Endometritis, which occurs in 2% to 13% of women with preterm PROM. Chrioaminitis is seen more commonly in women with prolonged preterm PROM, severe oligohydramnios, multiple vaginal examinations, and preterm PROM at an early gestational age. Additionally, because more fetuses with preterm PROM present with Mal-presentation (example breech), the risk of cesarean delivery with its attendant surgical risks to the prurient is higher in preterm PROM as compared with term deliveries [13].

Therefore, this study is aimed to determine prevalence and associated factors with PPROM among pregnant women admitted labor and delivery at Adama Hospital Medical College to increase quality of maternal and child health care of the hospital service.

The purpose of this study is to determine prevalence of preterm premature rupture of membrane and associated factors in the institution and find out the possible reason for the finding in the hospital. It is also give additional information to hospital management to improve the quality of care pregnancies complicated by preterm premature rupture of membrane at study area. In addition, it helps for the researcher as reference materials while on conducting further studies on similar problem.

2. Objectives

2.1. General

To assess the prevalence of preterm premature rupture of membrane and associated factors among pregnant mother admitted at Adama Hospital Medical College labor ward, from June 1 to august 30, 2.22, Adama, Ethiopia.

2.2. Specific

To determine prevalence of preterm premature rupture of membrane among pregnant mothers admitted labor ward from June 1 to august 30, 2.22, Adama, Ethiopia.

To identify associated factors of preterm premature rupture of membrane among pregnant mothers admitted labor ward from June 1 to august 30, 2.22, Adama, Ethiopia.

3. Methods

3.1. Study Period and Setting

This study was conducted in Adama town, from June to – August 30, 2022. Adama is located about 99kms east of Addis Ababa, (The capital city of Ethiopia). Adama town health institution serve large size of population from East and South Oromia, Afar, Somalia, South Nation Nationalities and people and even from some part of Amhara region. service given under the obstetrics and gynecologic department were ANC, EPI, labor and delivery, cervical screening and treatment, CAC, high-risk pregnant mother follow up Family planning, gynaecology case admission and OPD.

3.1.1. Sampling Procedures

The sample was selected using systematic random sampling technique from the mothers who came to Adama Hospital labor and delivery ward for 1month.

The total number mothers who visit Labor and delivery ward in one month at Adama Hospital were (extracted from the registration log book). K value is calculated and it is 4. So data was collected in every"4"interval until the desired sample is achieved in K=N/n.

$$K = 369/211 = 4.03 \sim 4$$

The first study participants was selected by lottery method and the sub sequence participants was be selected by systematic sampling method every 4 interval.

3.1.2. Study Design

The institution based cross sectional study was conducted.

3.2. Populations

3.2.1. Source Population

All pregnant mothers who attended admitted at Adama hospital during the study period were source population.

3.2.2. Study Populations

All systematically selected pregnant mothers admitted to Adama Hospital labor and delivery ward during the study period.

3.3. Eligibility Criteria

3.3.1. Inclusion

All pregnant mother (Gestational Age greater than or equal to 28 weeks) admitted labor and delivery ward during the study period,

3.3.2. Exclusion

Those women who had ill and unable to respond were excluded from the study.

3.4. Sample Size Determination

The sample size was determined by single population proportion formula using the following assumptions: the proportion of PPROM=14.6% from previous study conducted by Wollega University institute of Health science [16] (P = 0.146), the level of confidence to be 95% (Z α/2 = 1.96), margin of error between sample size and population parameter of 5% (d=0.05). And with addition of possible 10% non-response, the minimum sample size (n) was calculated with the following formula;

$$n = \frac{(z^{\alpha}/_2)^2}{d^2} P(1-P), \ n = \frac{(1.96)^2 \times 0.146(1-0.146)}{(0.05)^2} = 192$$

Adding 10% of non-response rate the final sample size is 211.

3.5. Data Collection Tools & Procedure

Semi structured questionnaire was adopted from literature of similar studies. The questioner measures of socio- demographic characteristics. obstetrics factor and personal characteristics. The data was collected by nurses who work in facility and there was one supervisor. First they were take training about how they administer and collect the questionnaires and critical ethical issues of the research for one day. They were introducing themselves and explain the purpose of the study using specific statements in a standard procedure. If the client refuses to give information they were jump to the next every 4 interval. Consent to participate was be obtained from each respondents and the privacy was maintained.

3.6. Data Quality Control

The questionnaires were prepared in English and it was translated to Afan Oromo and Amharic language and again back to English to confirm the consistency of the translation by language experts.

The pretest study was conducted prior to the data collection. The quality of data was assured by using validated questionnaires, training of data collectors and supervisors and pre-testing of all the data collection tools on 5% of the study subjects on Bishoftu hospital. The collected data was reviewed and checked for completeness by the supervisor in daily basis; the incomplete data was corrected. Data entry format template was produced and programmed.

3.7. Study Variables

3.7.1. Dependent Variable

Preterm rupture of membrane.

3.7.2. Independent Variables

Socio demographic: Maternal age, Place of residence, Occupation, Socio-economic status, Religion, Marital status, Daily transportation, monthly income.

Obstetric related factors: Gravidity, Parity, History of ANC, History of still birth, Gestational age at which membrane rupture, History of Previous PROM, Previous modes of delivery, Previous History of CS, Previous preterm labor, Abnormal vaginal discharge, Any co-morbidity, History of hypertension.

3.8. Data Processing and Analysis

Data was checked, coded and entered to Epi-info version 7

and was exported to SPSS version 21 for analysis. Descriptive statistics such as frequencies and percentage was computed to describe the study population in relation to relevant variables. Multiple logistic regression analysis was done using binary logistic regression model to estimate the OR at 95%CI. P-value <0.25 was used as cut-off points to declare significance at p<0.05 in the final model. The assumptions for normality of continuous variables and multi-collinearity of categorical independent variables were checked to be satisfied using appropriate methods. The normality was checked using graphic (Histogram with normal curve) presentation and multi-collinearity was assessed using correlation coefficient and variance inflation factor. Finally, either of the variables was used as predictor based on strength of association.

3.9. Operational Definitions

Premature rupture of membrane:-Rupture of Membrane at least for one hour before onset of lobar [1].

Preterm PROM:-Rupture of Membrane that occur after 28 weeks and before 37weeks of GA at least for one hour before the onset labor [12].

Preterm labor: Onset of labor before 37 weeks of gestational age [13].

3.10. Ethical Clearance

Ethical clearance and permission was obtained from Adama Hospital Medical College Ethical Review Committee and Permission was secured from Adama town health bureau and the health centers under its jurisdiction through a letter written by Adama Hospital Medical College. Informed oral consent was obtained from each respondent before interview. Confidentiality of individual client information was assured by using unique identifiers for study participants and limiting access to the principal investigator and research assistants of study information.

4. Result

4.1. Socio-Demographic Characteristics of Participants

Two hundred eleven pregnant women were included in this study making response rate of 100%. From total of the respondents 87 (41.2%) were in age group of 25-29 years. In case of marital status 195 (92.4%) were married. Regarding religion 111 (52.6%) was Muslim. Out of 211 participants 112 (53.1%) were at primary level of education while 132 (62.6%) were rural by resident and 101 (47.9%) were farmer by occupation (table 1).

Table 1. *Show socio demographic distribution of participant at Adama hospital medical college (N=211).*

Variables	Category	Frequency	Percent
Age	15-19	20	9.5
	20-24	62	29.4
	25-29	87	41.2
	30-34	15	7.1
	35-49	27	12.8
Residence	Rural	132	62.6
	Urban	79	37.4
Religion	Orthodox	73	34.6
	Muslim	111	52.6
	Protestant	27	12.8
Marital status	Married	195	92.4
	other	16	7.6
Mothers occupation	Housewife	111	52.6
	Merchant	57	27
	Student	3	1.4
	Private employee	40	19
Level of education	No formal education	29	13.7
	Primary school	112	53.1
	Secondary school	49	23.2
	College and above	21	10
Family monthly income	500-1500	2	0.9
	1501-2500	35	16.6
	2501-3500	102	48.3
	>3500	72	34.1

### 4.2. Obstetrics Characteristics History of Participants

The study revealed that 98 (46.4%) of study participants were 2 pregnancy, the majority 190 (90%) of study participants had ANC follow up, Almost all 158 (74.9%) of them were had no history of preterm delivery and 150 (71.1%) of participants has no history of PROM previously (Table 2).

Table 2. *Show obstetrics characteristics of participant at Adama hospital medical college (N=211).*

Variables		Frequency	Percent
Gravity	1	19	9
	2	98	46.4
	>2	94	44.5
Inter pregnancy interval	>2 years	114	54
	< 2 years	97	46
History of abortion	Yes	76	36
	No	135	64
Number of abortion	Once	59	28
	Twice	17	8.1
History of PROM	Yes	61	28.9
	No	150	71.1
History of preterm delivery	Yes	53	25.1
	No	158	74.9
ANC visit	Yes	190	90
	No	10	10
Previous history of STI	Yes	119	56.4
	No	92	43.4
Current abnormal vaginal discharge	Yes	45	21.3
	No	166	78.7
Pregnancy induced hypertension	Yes	59	28
	No	152	72

4.3. Prevalence of Preterm Premature Rupture of Membrane

This study revealed that the prevalence of preterm premature rapture of membrane was 13.3% at Adama hospital medical college (figure 1).
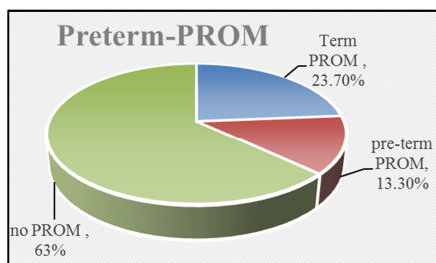
Figure 1. *Show the prevalence of preterm premature rapture of membrane at Adama hospital medical college (N=211).*

4.4. Factors Associated with Premature Rapture of Membrane

Association between dependent and independent variable were computed using binary logistic regression and those variables with p-value <0.25 were entered into multiple logistic regression analysis by using backward logistic regression. In multiple logistic regressions analysis significant association of independent variables with the preterm PROM was determined at p value < 0.05.

The predictors of were history of STI, history of abnormal discharge and history of PROM were associated to preterm premature rapture of membrane.

The result of this study showed that those respondent who had history of ruptured of membrane were three times (AOR: 3.8, 95% Cl: 2.2, 7.27) more likely to develop preterm premature rapture of membrane than those had no history of rupture of membrane.

The study indicate that having current pregnancy abnormal discharge were three times (AOR: 3.04, 95% CI: 1.62, 5.7) more likely to develop preterm premature ruptured of membrane than who had no history of abnormal discharge.

Those participants who had history of preterm delivery were three times (AOR: 3.1, 95% Cl: 2.02, 7.27) more likely to develop preterm premature ruptured membrane than who had no history of preterm delivery (Table 3).

Table 3. *Bivariate and multivariate association of premature rupture of membrane and associated factors among pregnant women admitted.*

Variable		Frequency		COR (95%CI)	AOR (CI 95%)
		№	%		
Previous PROM history	Yes	86	47%	2.9 (1.7-5.4)	3.8 (2.02-7.27)**
	No	125	59%	1:00	1:00
Abnormal vaginal bleeding	Yes	100	47.2%	2.75 (1.5-4)	3.04 (1.6-5.7)*
	No	111	52.8%	1:00	1:00
Preterm delivery	Yes	103	49.1%	0.6 (2.6-8.5)	3.15 (1.6-5.9)**
	No	108	50.9%	1:00	1:00

N. B: *p<0.05, **p<0.01, ***p<0.001

5. Discussion

The result of this study revealed that the prevalence of pregnant women who developed Preterm premature rupture of membrane at least one hour before the onset of true labor was about before 37 week of gestational age was 13.3%.

This finding is higher when compare to that of Foreign studies conducted in East China 12.5% [17], Tikur Anbessa hospital 1.4% [14] and Bihar 11.66% [19], Nigeria Teaching Hospital 7.5% [18]. This variation could be attributed to different life styles and demographic factors of the study participants as well as the countries.

This finding was lower than the study findings in Jiangsu Province Hospital in China 19.2% [17] and studies done in Jimma university teaching Hospital 14.6% [15], the difference could be attributed to the time gap between the studies and socio demographic distribution.

Abnormal vaginal discharge during pregnancy, preterm delivery, ANC follow up, history of previous PROM and STI are significantly associated with Premature rupture of membrane they also consist as association factor in other researches done in the University of Calabar Teaching Hospital, Nigeria [18], and Mekelle city, Ethiopia [9].

6. Conclusion

In this study level of the prevalence of preterm premature rapture of membrane was 13.3%, which is low compared to other studies conducted in similar setting. Factor like History of preterm delivery, abnormal discharge and history of PROM were factors associated with prevalence of preterm premature rapture of membrane.

7. Recommendation

Based on the findings of the current study the following recommendations were made.
1) Health providers should early Identification of high risk pregnancies and manage accordingly.
2) The facility develop protocol of obstetrics management and antibiotics use.
3) Creating awareness on pregnancy danger sign during ANC follow up.

8. Limitation

Since it is a cross sectional study, May not show the direct relation b/n cause and effect.

It might has recall bias among participants.

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