

Research Article

Prevalence, Risk Factors and Outcome of Prelabour Rupture of Membranes

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Introduction

Foetal membrane structure and function:

Human foetal membranes are the innermost tissue layers that form the intrauterine cavity and serve as a barrier between the foetal-placental and maternal compartments. Foetal membranes include the amnion (innermost layer of the intra-amniotic cavity) and the chorion (foetal tissue connected to maternal decidua) and are connected by the collagen-rich extracellular matrix (ECM).⁽¹⁾

Human foetal membranes, also known as amniochorionic or placental membranes, as the innermost lining of the amniotic cavity, play an important role in pregnancy maintenance. Membranes protect the foetus from bacteria and other environmental factors that can affect a normal pregnancy.⁽²⁾

Natural rupture of the membrane (ROM) occurs at term gestation in order to have a successful delivery. Prelabour rupture of the membrane (PROM), which occurs before the initiation of labour, is not often considered abnormal since it is commonly followed by uterine contractions.⁽³⁾

Prelabour rupture of membranes is classified as term, preterm, or pre-viable based on the gestational age at which it occurs:

- *Term pre-labour rupture of membranes:* Rupture of the membranes at or beyond 37 weeks' gestation prior to the onset of labour (according to ACOG practice bulletins and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) guidelines).⁽⁴⁾
- *Preterm pre-labour rupture of membranes (PPROM):* Rupture of

membranes prior to 37 weeks of gestation and before the onset of labour. This differs from the rupture of membranes during actual preterm labour (according to ACOG, NICE, RANZCOG).⁽⁵⁾

- *Pre-viable pre-labour rupture of membranes (pre-viable PROM):* as defined by the ACOG, rupture of the membrane that occurs before the gestational age of viability.⁽⁶⁾
- This category should be separated from preterm prelabour rupture of membranes because counselling and management are totally different. Although the definition of pre-viable PROM is universally acceptable, the definition of viability changes continuously and it varies widely between low and high resource countries.

Patients and Methods

This case-control study was conducted at Minia Maternity Hospital and Minia General Hospital during the period from October 2020 to March 2021. All pregnant women at or beyond 37 weeks gestation and met the criteria for inclusion in this study were included to determine prevalence, risk factors and outcomes of term prelabour rupture of membranes.

The protocol of the study was approved from the Ethical Committee of Medical Researches in Obstetrics and Gynaecology Department, Faculty of Medicine, Minia University. Before enrolling in the study, all eligible women were informed about the study's goals and methods. Before participation in the study, the women were requested to sign an informed consent form. Any woman had the right to quit

from the study at any time, with no consequences in terms of medical or ethical treatment.

Inclusion criteria were: Pregnant confirmed with PROM at or more than 37 weeks of gestation, including both Primiparous and multigravida, age group 18-45 years, cervical dilatation less than 3cm with lack of uterine contractions.

Exclusion criteria included women less than 37 weeks gestational age, women at active stage of labour, and women's refusal following counselling about the study.

Sample size:

The required sample size was calculated based on the statistical software EPI-INFO 7.2.4.0 using the double population formula for unmatched case control study by considering the proportion of abnormal vaginal discharge in cases 48.8% with Odds Ratio 3.31 in a previous study done in Ethiopia (Assefa, et al., 2018). With assumption of 95% CI, 80% power, control to case ratio 2:1 the sample size was 210 (140 control and 70 cases).

Women presented with prelabour rupture of membranes were recruited until the required sample size was fulfilled. Women who met the inclusion criteria but did not have prelabour rupture of membranes were chosen as controls.

The diagnosis of rupture membranes was made by the following: a highly

suggestive history; gush or leaking of clear fluid per vagina and a sterile speculum examination (SSE): A sterile Cusco's self-retaining vaginal speculum was used. Visualization of pooling of fluid in the posterior vaginal fornix of the patient was consistent with premature rupture of membranes as recommended by the Royal College of Obstetricians and Gynaecologists' Green-Top guideline number 73 (Thomson, 2019). In some cases, PV examination was required to determine cervical dilatation under complete aseptic condition. A specially designed sheet was used to obtain data about the different variables at admission.

Data was collected and entered using Microsoft Excel 2010 and exported to SPSS version 20 for analysis.

All recruited patients underwent the following:

Results

According to hospital records, 3599 women delivered at Minia Maternity Hospital and Minia General Hospital during the period from October 2020 to March 2021. 274 cases experienced term PROM with a prevalence of about 7.6%. 240 women were recruited for participation in the study based on inclusion criteria. 30 of them were excluded due to missing neonatal data or inability to postpartum follow-up. Data was collected from 210 participants (70 cases and 140 controls). (**Figure 1**)

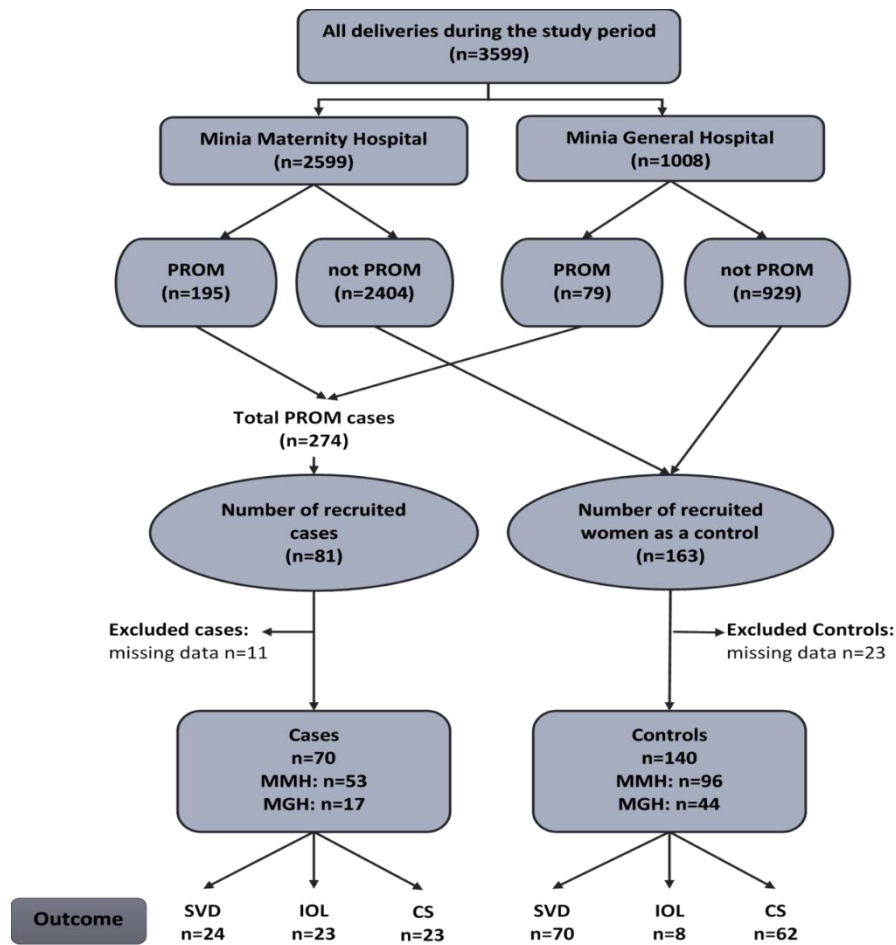


Figure 1 Flow chart

Sociodemographic characteristics:

The mean age of the women for the cases and controls was 25.1 ± 5.3 and 26.5 ± 5.7 respectively. The majority of cases and controls were living in rural areas. The majority of participants attended intermediate education. The majority of participants were housewives with equal

percentages in both groups (98.6%). Regarding social class, more than half of the participants were of low social class. None of the participants were of high social class. No statistically significant difference was found between both groups regarding sociodemographic characteristics. (Table 1)

Table 1: Sociodemographic characteristics:

		Case	Control	P value
		(N=70)	(N=140)	
Age (y)	Mean±SD (Range)	25.1±5.3 (17-39)	26.5±5.7 (18-45)	0.092
Residence	Rural	64 (91.4%)	126 (90%)	0.740
	Urban	6 (8.6%)	14 (10%)	
Education	Illiterate	27 (38.6%)	56 (40%)	0.789
	primary school	2 (2.9%)	5 (3.6%)	
	2ry/ intermediate	37 (52.9%)	75 (53.6%)	
	High	4 (5.7%)	4 (2.9%)	
Mother work	Working	1 (1.4%)	2 (1.4%)	>0.99
	Housewife	69 (98.6%)	138 (98.6%)	
Social class	Low	46 (65.7%)	73 (52.1%)	0.061
	Middle	24 (34.3%)	67 (47.9%)	
	High	0 (0%)	0 (0%)	

Past obstetric and gynecologic history:

Patients with a history of PROM twice or more represented 14.3% of cases and 5% of controls, with a P-value < 0.05, which means a significant relation between repeated PROM twice or higher and its recurrence. However, PROM once before was not significantly correlated to its recurrence. Almost three quarters of participants had no previous caesarean sections. (Figure 2) There was no significant difference in inter-pregnancy interval and history of abortions between the two groups. The majority of participants had no history of previous preterm labour. Only one woman in both groups had cervical surgery (cerclage). More than half of patients used modern contraception, combined pills were the most commonly used followed by IUD in both groups. (Table 2)

Discussion

The majority of cases of prelabour rupture of foetal membranes occur in otherwise healthy women with no identified cause. Risk factors include a history of PROM, maternal illnesses such as urinary tract infection, bacterial vaginosis, cervicovaginitis, and cervical insufficiency.⁽⁷⁾ In addition to the above mentioned factors, membrane dysfunction at molecular level, collagen destruction and programmed cell

death in fetal membranes also contribute to PROM.⁽⁸⁾

Patients with PROM are more susceptible to ascending infection; the longer the time interval between membrane rupture and the onset of labor, the greater the risk of ascending infection and subsequent chorioamnionitis. Dysfunctional labour, increased caesarean rates, postpartum haemorrhage and endometritis increase with PROM.⁽⁸⁾ Respiratory distress syndromes, neonatal sepsis, meconium presence, and an Apgar score of less than seven in five minutes are all linked with severe oligohydramnios after PROM.⁽⁹⁾

There is a lack of studies which focus on the term PROM in Egypt. Most previous research studied PPRM. The objectives of this study were to determine the prevalence, risk factors, and maternal and fetal outcomes of PROM at term. Our study focused on term PROM patients since newborns of this gestation seldom experience prematurity-related complications; hence, the morbidity associated with membrane rupture may be more easily studied.

During the study period, a total of 210 women (70 cases and 140 controls) were enrolled in the study for analysis after

fitting the inclusion criteria. A specially designed sheet was used to obtain data about different variables. Sociodemographic data, data about past obstetric and gynaecological history, different determinants for PROM based on results of previous studies, physical activities during pregnancy, maternal and foetal morbidity or mortality, hospital stay, and NICU admission were recorded and extracted to SPSS for statistical analysis.

PROM prevalence varies by region and population, and various variables influence its occurrence. In our study, out of 3599 women delivered during the study period, only 270 experienced term PROM with a prevalence of 7.5%, which was close to the study by Idrisa, et al. (6.9%) and the study by Duff (8%). The prevalence was 6% in Endale et al., and 6.3% in Byonanuwe et al.,⁽¹⁰⁾

The discrepancy in prevalence might be attributed to missed diagnoses and varying delivery rates. Sometimes, patients are in established labour before arriving at the hospital following membrane rupture, which may result in non-documentation of such cases as PROM, leading to the observed difference in prevalence.

Conclusion

In the current study, prevalence of term PROM was 7.6%. Abnormal vaginal discharge, a history of repeated PROM and recent coitus were identified as significant risk factors for PROM. Term PROM significantly increasing the incidence of induction and length of hospital stay, but it had no significant effect on neonatal outcomes.

Since the study found no significant difference in the neonatal outcomes, which was attributed to the short PROM delivery interval in most of the study cases, immediate induction of labour should be initiated shortly after admission for favourable cases to avoid severe neonatal and maternal adverse outcomes, as it is a matter of time.

Recommendations

Early diagnosis and management of abnormal vaginal discharge and culture if possible to give suitable treatment of infection and prevent its sequelae.

Genitourinary infections should be treated immediately and effectively with appropriate antibiotics not only during pregnancy but also during the inter-pregnancy interval.

Sexual intercourse should be avoided in the last month of pregnancy, or condoms should be used to limit the inoculation of germs and prostaglandins found in semen.

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