



Premature Rupture of Membranes at Term Risk Factors and Outcomes

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Abstract

Background: Premature rupture of membranes at term management is a challenge, whether to induce labor or allow spontaneous initiation of labor with maternal and fetal surveillance. There is an increased maternal risk of morbidity, perinatal risk of morbidity, and mortality.

Purpose: To identify risk factors and outcome of premature rupture of membranes at term in low-risk patients.

Methods: This was a cross-sectional hospital-based study. The study was conducted at Omdurman New Hospital during the period from March 2021 to September 2021. The study sample was 98 women who fulfilled the inclusion criteria of the study. Data was collected using a questionnaire filled with women after taking informed consent.

Results: The risk factors for premature rupture of membranes were vaginal discharge 39(39.8%), history of premature rupture of membrane 29(29.6%), polyhydramnios 21(21.4%), urinary tract infections 19(19.4%) and malpresentation 17(17.3%). The management received were expectant management 63 (64.3%), induction of labor 19(19.4%), and cesarean section 16(16.3%). Most of the women 68 (69.4%) had no complications. The reported maternal complications were postpartum hemorrhage 19(19.3%), labour dystocia 5(5.1%), perineal, vaginal and cervical trauma 3(3.1%), and sepsis 3(3.1%). The majority of babies 74 (75.5%) had no complications. The fetal complications were meconium aspiration 12(12.2%), birth asphyxia 10(10.2%), shoulder dystocia 1(1%) and perinatal death 1(1%).

Conclusion: In low-risk women, factors such as polyhydramnios, vaginal discharge, and previous history of premature rupture of the membrane predispose to the development of premature rupture of the membrane. The majority of mothers and babies had no complications; however, postpartum hemorrhage was reported in some mothers, and birth asphyxia and meconium aspiration were reported in the neonates.

Keywords: Premature; Rupture; Membranes; Term; Risk Factors; Outcomes

Abbreviations: PROM: Premature Rupture of the Membranes; SMSB: Sudan Medical Specialization Board;

EDC: The Educational Development Centre.

Introduction

Premature rupture of the membranes (PROM) is the rupture of membranes before the onset of labor and occurs in about 8% of pregnant women worldwide. The etiologies are known in about 40% of cases [1-3]. Risk factors include infections like urinary tract infections, sexually transmitted diseases, lower genital tract infections (e.g., bacterial vaginosis), infections within the amniotic sac membranes (chorioamnionitis), polyhydramnios, illicit drug use during pregnancy, Invasive procedures (e.g., amniocentesis, Nutritional deficits cervical insufficiency, low socioeconomic status prior PROM, bleeding in the later parts of pregnancy, smoking, and an underweight mother, multiple gestations [4,5]. Diagnosis is made by a careful medical history is taken, an examination is conducted using a sterile speculum, and an ultrasound of the uterus is performed [6]. If it occurs before 37 weeks it is known as preterm PROM. After 37 weeks of gestation, it is term PROM [7].

During pregnancy, a woman's treatment is determined by how far along she is and whether complications are present. In all women with PROM, the age of the fetus, its position in the uterus, and its well-being should be evaluated with ultrasound, Doppler fetal heart rate monitoring, and uterine activity monitoring which indicate whether or not contractions are occurring and may indicate that labor has begun. At any age, if fetal well-being appears to be compromised, or if an intrauterine infection is suspected, the baby should be delivered quickly by induction of labor [8]. Maternal complications include intra-amniotic infection, which occurs in 13%–60% of women with PROM, placental abruption, and postpartum endometritis [9,10]. Pre-term birth, infection, hypertensive disease, and asphyxia are cited as the most common contributors to maternal and fetal mortality in developing countries [11,12].

Management of women with premature ruptured membranes is controversial. Allowing spontaneous labor or inducing labor. Also, a study found women benefitted from induction when induced at gestational age at ≥ 37 weeks compared to conservative management [13]. Furthermore, PROM at term after induction with prostaglandins or oxytocin showed no difference in benefit [14,15]. Previously, Assefa et al identified the risk factors for term pre-labor premature rupture of membranes among pregnant women admitted to public hospitals in Mekelle City, Tigray, Ethiopia. Multivariable logistic regression showed that history of abortion, history of PROM, history of cesarean section, and abnormal vaginal discharge in the index pregnancy were positively associated with premature rupture of membranes [16]. Amulya and Ashwini studied maternal morbidity in the term PROM and found PROM was common in the age group of 20-29 years (80%), and common in primigravida. Based

on the results of the study, the majority of the participants belonged to a low socioeconomic status (80%), 13.3% belonged to a middle socioeconomic status, and 6.6% belonged to a higher socioeconomic status. In 27.05% of cases, spontaneous labor was observed, 56.50% of cases were delivered by induction, and 20% of cases were delivered by LSCS. The rate of maternal morbidity was 16.6%, which includes febrile morbidity accounting for the maximum with 9.6% followed by wound infection at 3.33% and others were PPH (1.6%) and puerperal sepsis (1.6%) [17].

In Sudan, training manuals and guidelines were prepared to make health professionals competent in managing women with obstetric emergencies including PROM. Other strategies were also developed to address the problem including referring women with prolonged rupture of membranes (longer than 12 h) to a referral-level facility for assessment and use of prophylactic antibiotics. Even though a study was carried out to assess the fetal-maternal outcome of PROM, information about the risk factors for PROM in Sudan is not available.

Results

The study included 98 women diagnosed PROM at term, demographic characteristics, the most age distribution was (20–29) years reported in 35(35.6%) of the women, women who had secondary level of education were 42(42.9%), the duration of marriage (5 – 10) years found in 41(41.8%), booked women 44(44.9%), multipara was 51(52%), primigravida 29(29.6%) and grand multipara (Table 1).

Demographic characteristics	Frequency	Percent
Age		
<20 years	18	18.4
20-29 years	35	35.6
30-39 years	32	32.7
> 39 years	13	13.3
Education		
Illiterate	20	20.4
Primary	24	24.5
Secondary	42	42.9
University	12	12.2
Duration of Marriage		
< 5 years	25	25.5
5 - 10 years	41	41.8
> 10 years	32	32.7
Total	98	100

Table 1: Demographic Characteristics of women with PROM at term (n=98).

Obstetrics characteristics of women, multipara was 51(52%), primigravida 29(29.6%) and grand multipara, the gestational at PROM was 37 – 38 weeks in 45(45.9%) of the women, 39 – 40 weeks 38(38.8%) and more than 40

weeks 15(15.3%), the duration of drainage of liquor was 6 – 4 hours 29(29.6%), 7 –12 hours 27(27.6%), 11 – 24 hours 17(17.3%), less than 4 hours 13(13.3%) and more than 24 hours 12(12.2%) (Table 2).

Obstetrics characteristics	Frequency	Percent
Antenatal care		
Irregular	30	30.6
Regular	44	44.9
No ANC	24	24.5
Parity		
Primigravida	29	29.6
Multiparous	51	52
Grand multiparous	18	18.4
Gestational age		
37 – 38 weeks	45	45.9
39 – 40 weeks	38	38.8
>40 weeks	15	15.3
Drainage of liquor duration		
< 4hours	13	13.3
4-6 hours	29	29.6
7-12 hours	27	27.6
11-24 hours	17	17.3
Total	98	100

Table 2: Obstetrical Characteristics of women with PROM at term (n=98).

Risk factors for PROM at term. The risk factors of premature rupture of the membrane were vaginal discharge 39(39.8%), history of premature rupture of membranes

29(29.6%), polyhydramnios 21(21.4%), and urinary tract infections 19 (19.4%) (Table 3).

Risk factors	Yes		No		Total	
	N	%	N	%	N	%
Vaginal discharge	39	39.8	59	60.2	98	100
History of PROM	29	29.6	69	70.4	98	100
Polyhydramnios	21	21.4	77	78.6	98	100
UTI	19	19.4	79	80.6	98	100
Malpresentation	17	17.3	81	82.7	98	100

Table 3: Risk factors of PROM at term (n=98).

A significant association was found between adverse maternal outcomes and longer duration of drainage of liquor,

vaginal mode of delivery, and no antenatal care (P value < 0.05) (Tables 4-6).

Maternal outcome	ANC					
	No		Irregular		Regular	
	N	%	N	%	N	%
No complications	17	70.8	19	63.3	32	72.7
Labour dystocia	1	4.2	1	3.3	3	6.8
Perineal, vaginal, and cervical trauma	0	0	1	3.3	2	4.5
Postpartum hemorrhage	4	16.7	8	26.7	7	15.9
Sepsis	2	8.3	1	3.3	0	0
Total	24	100	30	100	44	100

P value=0.021<0.05

Table 4: Maternal out come and pattern of ANC (n=98).

Maternal outcome	Duration of drainage of liquor									
	< 4		4-6		7-12		13-24		> 24	
	hours		hours		hours		hours		hours	
	N	%	N	%	N	%	N	%	N	%
No complications	7	53.8	20	69	20	74.1	10	58.8	11	91.7
Labour dystocia	2	15.4	1	3.4	1	3.7	1	5.9	0	0
Perineal, vaginal, and cervical trauma	0	0	0	0	3	11.1	0	0	0	0
Postpartum hemorrhage	4	30.8	7	24.1	1	3.7	6	35.3	1	8.3
Sepsis	0	0	1	3.4	2	7.4	0	0	0	0
Total	13	100	29	100	27	100	17	100	12	100

P value = 0.011 < 0.05

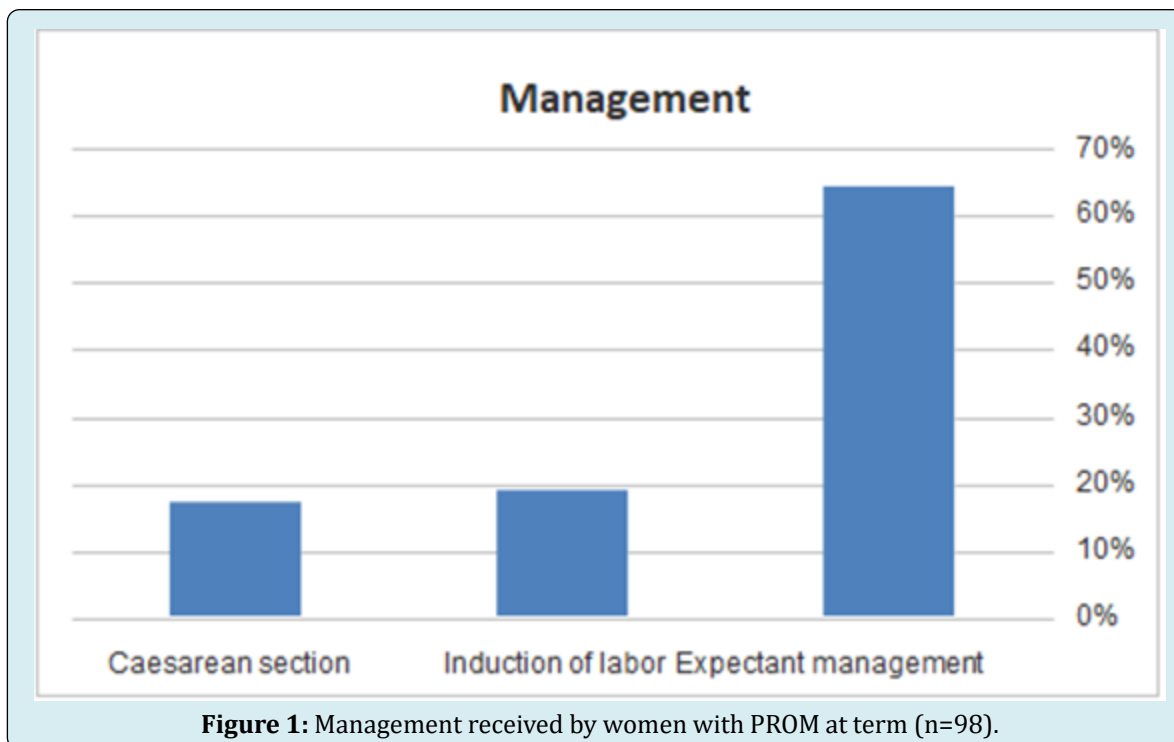
Table 5: Maternal outcome about the duration of drainage of liquor (n=98).

Maternal outcome	Mode of delivery					
	CS		Induced VD		Spontaneous VD	
	N	%	N	%	N	%
No complications	38	77.6	17	56.7	13	68.4
Labour dystocia	2	4.1	2	6.7	1	5.3
Perineal, vaginal, and cervical trauma	3	6.1	0	0	0	0
Postpartum hemorrhage	6	12.2	10	33.3	3	15.8
Sepsis	0	0	1	3.3	2	10.5
Total	49	100	30	100	19	100

P value = 0.016 < 0.05

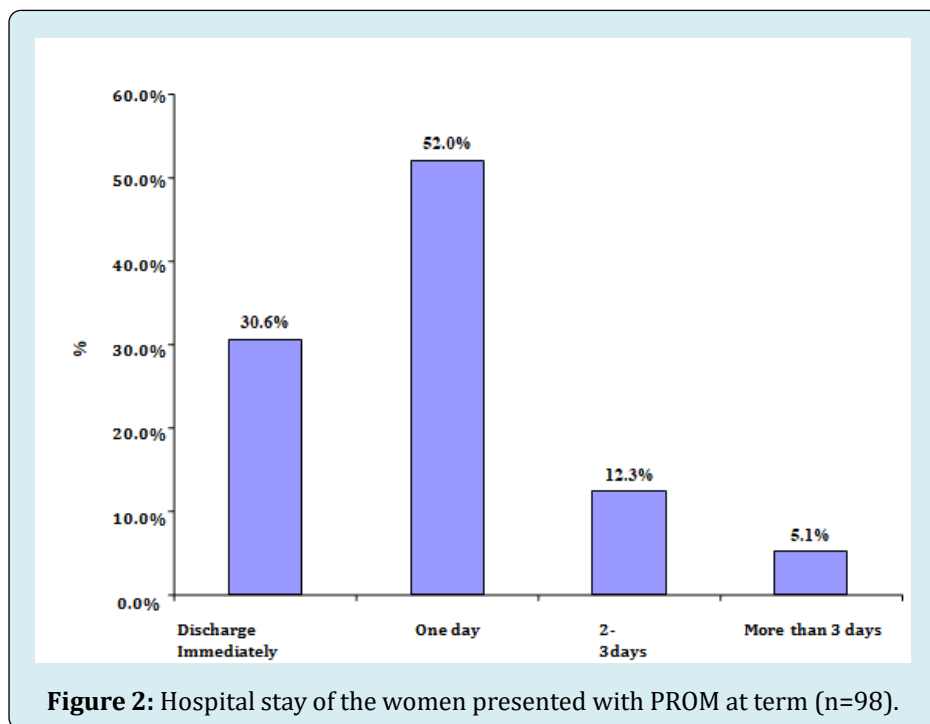
Table 6: Maternal outcome about the mode of delivery (n=98).

The management received were expectant management 63(64.3%), induction of labour 19(19.4%) and cesarean section 16(16.3%) (Figure 1).



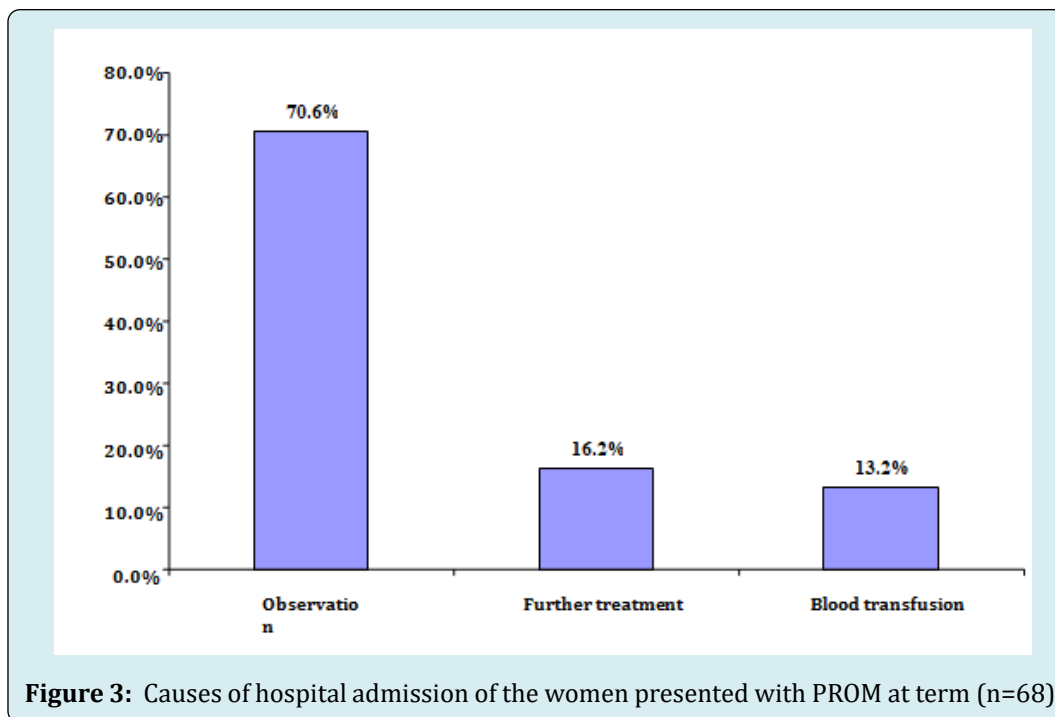
The women discharged immediately were 30(30.6%), admitted for one day 51(52%), admitted for 2 - 3 days

12(12.3%) and admitted for more than 3 days were 5(5.1%) (Figure 2).



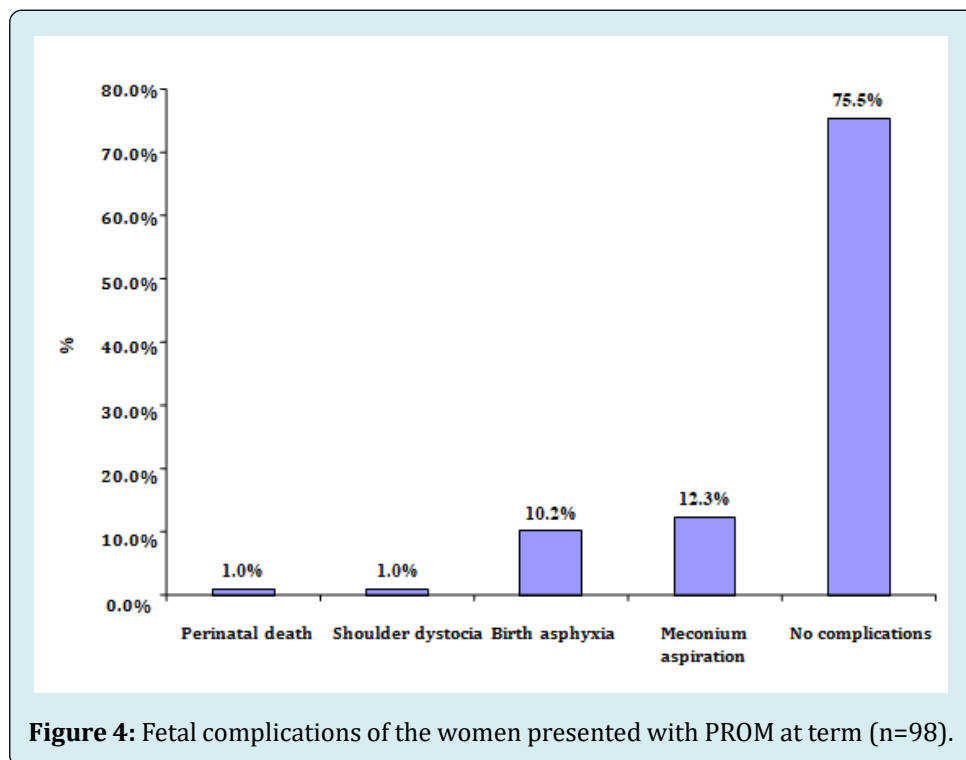
The causes for admission for 1 day and more (n=68) were observation 48(70.6%), further treatment 11(16.2%)

and for blood transfusion 9(13.2%) (Figure 3).



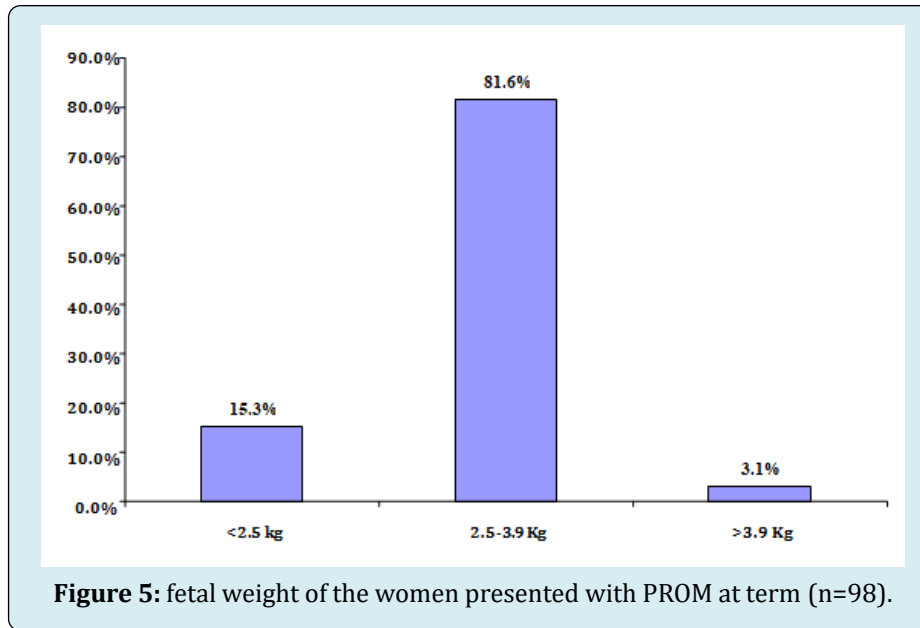
The majority of the babies 74(75.5%) had no complications. The fetal complications were meconium

aspiration 12(12.2%), birth asphyxia 10(10.2%), shoulder dystocia 1(1%) and perinatal death 1(1%) (Figure 4).



The fetal weight was 2.5 – 3.9 kg 80(81.6%), less than 2.5 kg 15(15.3%) and more than 3.9 kg 3(3.1%) (Figure 5).

Of the babies admitted to the neonatal intensive care unit 32(32.7%) and 66(67.3%) did not admit (Figure 6).

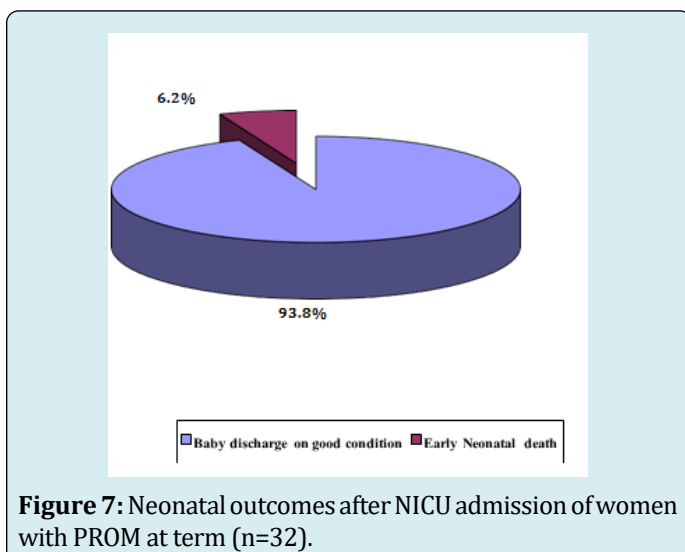
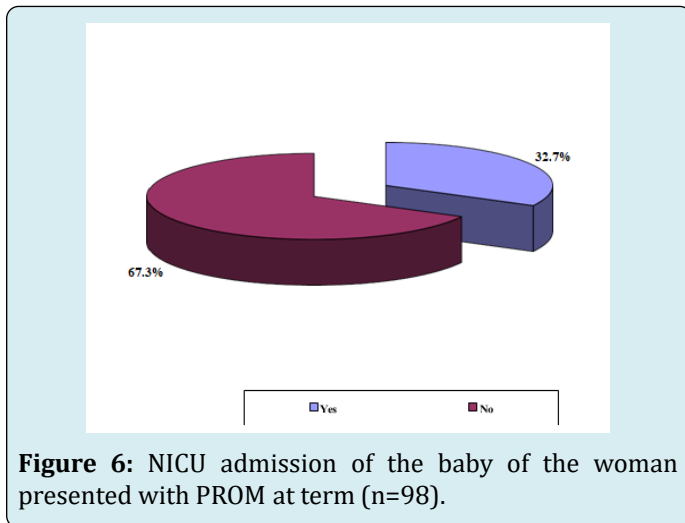


After neonatal intensive care unit admission (n=32) the majority of the babies 30(93.8%) were discharged in good condition and 2(6.2%) were early neonatal deaths (Figure 7).

Discussion

In this study, 98 women with PROM delivered in Omdurman New Hospital (March 2021 to September 2021) were included to identify risk factors and outcomes for premature rupture of membranes at term in Low-risk patients. The study found that the risk factors for PROM were abnormal vaginal discharge 39(39.8%), previous history of premature rupture of membrane 29(29.6%), polyhydramnios 21(21.4%), urinary tract infections 19(19.4%) and malpresentation 17(17.3%). Padmaja and Swarupa evaluated the maternal and perinatal outcomes in term PROM and found that a previous history of PROM was in 15% of the patients, a history of abortion was seen in 12% of the patients, and a history of preterm PROM was observed in 7% of patients [18].

The management received were expectant management 63(64.3%), induction of labour 19(19.4%) and cesarean section 16(16.3%). On the other hand, among the women who received expectant management, the mode of delivery in women who received expectant management (n=63) was cesarean section 27 (42.9%). Induced vaginal delivery 20 (31.7%) and spontaneous vaginal delivery 16(25.8%). Assefa, et al identified the risk factors for term pre labor and premature rupture of membranes among pregnant women admitted to public hospitals in Ethiopia. Multivariable logistic regression found that history of abortion, history of PROM, history of cesarean section, and abnormal vaginal



discharge in the index pregnancy were positively associated with premature rupture of membranes [16]. Vhora among women presented with PROM showed that the incidence of cesarean section in this study is 28 % and the most common indications for cesarean delivery were fetal distress, malpresentation, cephalopelvic disproportion, and failed induction [19].

Shetty and Shetty investigated the labor, maternal, and perinatal outcomes in the pre-labor rupture of the membrane at term. The rate of cesarean is higher in the study group (14.7%) and the most indication is failure to progress intrapartum morbidity (16%) in the same group and perinatal morbidity was 20% [20]. Most of the women 68(69.4%) had no complications. The reported maternal complications were postpartum hemorrhage 19(19.3%), labor dystocia 5(5.1%), perineal, vaginal and cervical trauma 3(3.1%), and sepsis 3(3.1%). Endale et al determined the maternal and fetal outcomes and associated factors in the term PROM in Ethiopia. About 22.2% of women found unfavorable maternal outcomes [21]. The majority of babies 74 (75.5%) had no complications. The fetal complications were meconium aspiration 12(12.2%), birth asphyxia 10(10.2%), shoulder dystocia 1(1%) and perinatal death 1(1%). This is similar to how Padmaja and Swarupa evaluate the maternal and perinatal outcomes in term PROM cases. History of the term PROM was seen in 15% of the patients, History of abortion was seen in 12% of the patients, and history of preterm PROM was observed in 7% of patients. When risk factors and PPRM were compared, anemia was 20%, UTI was 10%, lower genital infections were 8%, cervical stitch was 2%, malpresentations were 4%, hydramnios was 4% and there were no risk factors in 27% of the patients.

The number of cases of maternal morbidity was highest in > 24 hours i.e., 26.7%, perinatal morbidity cases were highest in 12-24 hours 30%, and mortality among perinatal cases was 5% in 12-24 hours and >24 hours of PROM [18]. Endale, et al. found that about 22.2% of women showed unfavorable maternal outcomes. The most common cause of maternal morbidity and mortality was puerperal sepsis. About 33.5% of neonates experienced unfavorable outcomes. The duration of PPRM >12 hours latency >24 hours, residing in rural areas, and birth weight less than 2500 g were associated with unfavorable outcomes [21].

Strength and Limitations

This study is considered the first in Sudan, one of the strengths of this study is that the samples and information were collected according to the ACOG definition of PROM at term and criteria for diagnosis. Also, data was collected by registrars who offered treatment for patients, which had a positive impact on the inclusion criteria of patients,

management outcomes to both mother and doctor. The study period of six months was resulted in the involvement of adequate PROM at term women which makes the study possible so the study population's characteristics can be generalized to Sudan and countermeasures can be developed in countries with similar characteristics. One of the limitations of this study is that it was conducted in one hospital, so it cannot be compared. Also not compared with preterm prelabor ruptured of membranes.

Conclusion

In low-risk women, factors such as polyhydramnios, vaginal discharge, and a previous history of premature rupture of the membrane predispose to the development of premature rupture of the membrane. The majority of mothers and babies had no complications; however, postpartum hemorrhage was reported in some mothers, and birth asphyxia and meconium aspiration were reported in the fetus.

Recommendations

Good neonatal intensive care unit backup can help reduce perinatal morbidity and mortality Timely diagnosis of PROM by the patient and early approach to the hospital along with vigilant monitoring and acceleration of labor can help in a significant reduction in maternal and fetal morbidity and mortality. Women should be observed for signs of clinical chorioamnionitis every four to six hours.

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Author Contribution

All authors contributed to the manuscript writing. Zainab Hashim, Bashir Abdeen, Hajar Suliman were involved in the conception and design of the study, writing the proposal, analysis, interpretation of data, and manuscript writing. Awadalla Abdelwahid, AyatEltigani and Ahmed Elhadary were involved in the analysis and interpretation of data, methodology, and manuscript writing.

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