Original Article

Home-based versus hospital-based in Pregnancies with Preterm Premature Rupture of Membranes

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ABSTRACT

Introduction: Preterm premature rupture of membranes (pPROM) typically leads to spontaneous preterm birth within several days. The present study was thus conducted to compare home care versus hospital care for pregnant mothers with pPROM.
Methods: This study was carried out with the aim of home care versus hospital care for pPROM between 26-34 weeks' gestation in Iran. Data analysis based on t-test and chi-square statistical tests.
Results: According to the findings of the data analysis, there were no significant differences between the hospitalized and planned home groups in obstetrical and demographic characteristics (P>0.05). In terms of maternal, fetal and neonatal outcomes, there was no significant difference between the two groups (P>0.05). Furthermore, the number of normal deliveries in the planned home group higher than the hospitalized group (63.6% vs. 36.4% respectively) and the difference was significant (P=0.018)
Conclusions: According to the results of the present study, it can be stated that low-risk mothers with pPROM can be monitored at home if care services and health education are provided and awareness of danger signs is provided.

Keywords: Premature rupture, Preterm, pPROM, Home care..

Introduction

Premature rupture of membranes (PROM) refers to the chorioamnionitis rupture of membranes and passage of fluid through the birth canal before the onset of labor (1). PROM is classified into two groups according to gestational age. It is called preterm premature rupture of membranes (pPROM) if it occurs before the gestational age of 37 weeks and pre-labor rupture of the membranes (PROM) if it occurs after the gestational age of 37 weeks (3). Although the cause of PROM is unknown, researchers worldwide have investigated its maternal and fetal risk factors. These causes include sexually transmitted infections (STIs), maternal smoking, a previous history of premature birth, short cervical length, polyhydramnios, multiple pregnancies, a history of abortion, poor socioeconomic status, poor nutritional status, and connective tissue disorders (4,5).

The prevalence of PROM varies in different countries, affecting 4-10% of pregnancies worldwide, but pPROM accounts for about 3% of all births (1). According to evidence, the prevalence of pPROM is 1.3% in Brazil (6), 19.2% in China (7), 5.3% in Egypt (8), and 3.3% in Nigeria (9).

Furthermore, PROM accounts for 30% of premature births and their complications, including birth asphyxia and respiratory distress (10). It is an important cause of neonatal sepsis, fetal distress, and birth asphyxia due to a rapid reduction of amniotic fluid volume (11). A two-year study at Jimma University estimated the incidence of PROM to be 14.5% (12). PROM is also related to perinatal infection and increases the risk of placental abruption by 5% compared to the general population (13). Delayed motor and brain development and paralysis can be seen in infants of women with PROM (14).

PROM increases perinatal mortality four times and neonatal complications three times. Respiratory distress syndrome (RDS) (10-40%) is the most common serious acute complication after pPROM (15). Furthermore, pPROM accounts for one-third of preterm births and 90% of neonatal deaths (16).

Although preterm labor and pPROM are distinct, they can be treated by many similar interventions. The management of pPROM depends on the gestational age when the rupture of membranes occurs. There is no consensus on the optimal management of pPROM in women whose fetuses are relatively mature, as well as in near-term pregnancies (more than 34 weeks of pregnancy) (17).

Countries are seeking to improve the health of mothers and infants through their national health policies (18). In addition to health policies and programs, international agreements such as Millennium Development Goals (MDGs) and Sustainable Development Goals are significant in reducing infant and maternal mortality and morbidity (19). Despite these efforts, infant and maternal morbidity and mortality remain the main challenges in developing countries. Countries have failed to achieve plans to reduce infant and maternal mortality, and thus there is a need to design another strategy called the sustainable development goal (20**)** Sheibani and colleague in a historical cohort study on 8460 cosecutive pregnant women recruited for chromosomal abnormalities screening within the first trimester at fertility infertility and perinatology research center in ahvaz joundishapor university of medical sciences between april 2014 and april 2015 showed that measuring the serum level of MOM PAPP-A during the first trimester can be a valuable marker for predicting adverse outcomes of pregnancy such as SGA PE and abortion. The best cutoff value for this marker to predict the outcome is 0.3 in pregnant Iranian women(21)

The aim of the treatment management is to prevent possible harm of pPROM for mothers and fetuses in terms of early symptoms of fetal or maternal infection, spontaneous onset of labor, and planning for term labor if it is not carried out (22). There is no evidence supporting the best place to perform the treatment process. Although doctors may feel that it is easier to monitor women in hospitals, women's views may differ (23).

Since there is no similar study in this field, the results of the present study can be utilized as a strategy for health and treatment in countries. Given the high hospital costs, it helps to reduce care costs. The present study was thus conducted to compare home care versus hospital care for pregnant mothers with pPROM.

Method

The present study had a comparative, descriptive, and analytical type and was conducted in 2022. The statistical population consisted of all pregnant women with premature rupture of membranes (PROM) who visited Imam Khomeini Hospital in Ahvaz during the second half of 2022. The census sampling was performed and the sample size was equal to 110 pregnant women with PROM.

Inclusion criteria included of the pPROM confirmed, recording complete patient information in the hospital file, single fetus, gestational age between 26-34 weeks, singleton, call phone access, AFI≥8 cm, absence of danger symptoms such as chorioamnionitis, labor onset symptoms and fetal distress or IUGR and persistent and visible leakage of amniotic fluid. Exclusion criteria were diabetes, preeclampsia, heart diseases and mother's unwillingness to participate in the study.

The pregnant women, who were not willing to continue participation in the study and also those whose disease severity increased, were excluded from the study.

During the sampling, in order to minimize the bias, we tried to observe the homogeneity of the demographic and obstetric characteristics between the two groups.

After receiving the necessary permits and an ethical code (IR.AJUMS.REC.1400.628) from Ahvaz Jundishapur University of Medical Sciences (AJUMS), the researcher went to Imam Khomeini Hospital and detected pregnant women who met the inclusion criteria. The samples received an explanation of research objectives and completed the informed consent forms if they consented to participate. Thereafter, the pregnant women were randomly classified into two groups: The first group (n=55) received home care, but the second group (n=55) was hospitalized and received hospital care.

Data on pregnant women were collected using a checklist, including demographic and disease-related characteristics.

According to the treatment protocol governing the Imam Khomeini hospital for the management of pPROM women, using the history of the mother and examination with a speculum to observe the amniotic fluid in the posterior fornix or using one of the laboratory methods, the pPROM was confirmed. Then, the mothers were hospitalized and received the following care.

- Check daily tests of White Blood Cells (WBC) and C-Reactive Protein (CRP) for 48 hours
- Check of Urinalysis (UA) and urine culture (UC) test on the first day of hospitalization
- Check vital signs every 6 hours
- Ultrasound for the possible diagnosis of developmental disorders and fetal abnormalities and also to determine the amniotic fluid index (AFI)
- Color doppler ultrasound for the possible diagnosis of fetal intrauterine growth restriction (IUGR)
- Corticosteroid injection for fetal lung maturation (Two doses of betamethasone 12 mg 24 hours apart)
- Intravenous antibiotic injection every 6 hours and then continued orally for 5 days

After 48 hours of hospitalization, the pregnant women were told that they must be hospitalized to receive care until delivery. If the pregnant woman were unwilling to be hospitalized, they were discharged with personal consent.

Pregnant women, who were in the home care group, received 48-hour injectable antibiotics as outpatients, and then visited the obstetrics clinic of the hospital twice a week for checkups and were followed up by phone. The researcher regularly contacted pregnant women and gave the necessary guidance for visiting a perinatologist (twice a week), taking oral antibiotics, necessary care, and the need to perform tests to check health. Pregnant women were asked to go to the hospital or contact the researcher and get the necessary guidance as soon as they saw dangerous signs.

The mean and standard deviation were utilized to describe the quantitative variables, and the distribution and frequency percentage were used to describe qualitative variables. The

statistical analysis in this work involved the use of the Chi-Square test and t TEST, which was performed using SPSS software version 16 with a significance level of less than 0.05.

Results

Table (1) presents the demographic and pregnancy-related characteristics of pregnant women. Based on the table, all variables were not significantly different between the two groups of pregnant women under hospital and home care, and thus the two groups were homogeneous (P>0.05).

Table 1. Demographic and obstetric characteristics

Variables		hospital-based	Home-based	P value
Age, year (Mean±SD)		28.27±7.77	29.91±6.54	0.238*
BMI (Mean±SD)		26±4.61	25.05±4.32	0.270*
PWG (Mean±SD)		12.21±4.36	12.50±4.31	0.726*
GA (Mean±SD)		31.16±8.89	31.1±2.51	0.959*
AFI (Mean±SD)		14.92±3.77	15.12±4.01	0.788*
Gravid, N (%)	**1**	26 (47.3)	25 (45.5)	0.725**
	2-3	22 (40)	20 (36.4)	
	4≤	7 (12.7)	10 (18.2)	
Para, N (%)	**0**	32 (58.2)	31 (56.4)	0.828**
	2-3	18 (32.7)	17 (30.9)	
	4≤	5 (9.1)	7 (12.7)	
type of previous delivery, N (%)	**NVD**	13 (23.6)	15 (27.3)	0.903**
	CS	8 (14.5)	8 (14.5)	
	None	34 (61.8)	32 (58.2)	
history of PROM, N (%)	**Yes**	7 (12.7)	48 (87.3)	0.781**
	No	8 (14.5)	47 (85.5)	
history of abortion, N (%)	**Yes**	6 (10.9)	49 (89.1)	0.751**
	No	5 (9.1)	50 (90.9)	
Disease records in the current pregnancy, N (%)	**Diabetes**	8 (14.5)	11 (20)	0.278**
	Hypertension	2 (3.6)	2 (3.6)	
	Thyroid Disorders	3 (5.5)	0	
	Liver Disorders	0	3 (5.5)	
	Connective Tissue Disorders	2 (3.6)	2 (3.6)	
	Kidney Disorders	2 (3.6)	4 (7.3)	
	None	38 (69.1)	33 (60)	
Presentation, N (%)	**Cephalic**	34 (61.8)	39 (70.9)	0.601**
	Breech	17 (30.9)	13 (23.6)	
	Transverse	4 (7.3)	3 (5.5)	

* Independent t-test, ** Chi-Square Test

SD: Standard deviation, AFI: Amniotic Fluid Index, BMI: Body Mass Index, GA: Gestational Age, PWG: Pregnancy Weight Gain

Table (2), presents the demographic and pregnancy-related characteristics of pregnant women. Based on the table, all variables were not significantly different between the two groups of pregnant women under hospital and home care, and thus the two groups were homogeneous (P>0.05).

In table (2), pregnancy outcomes in pregnant women are shown. Based on the table, all the variables were not significantly different between the two groups of pregnant women under hospital and home care (P>0.05). It was observed that home care significantly increased women's need for cesarean section compared to women under hospital care (P<0.05).

Table 2. Comparison of outcomes of two groups

Variables		hospital-based	Home-based	P value
Age at termination of pregnancy, year (Mean±SD)		33.16±2.50	33.54±2.36	0.412*
Birth weight (gr), (Mean±SD)		2514±0.87	2468±0.88	0.786*
Distance from pPROM to delivery (week), (Mean±SD)		4.40±2.27	4.21±2.12	0.635*
Type of delivery, N (%)	**NVD**	23 (41.8)	35 (63.6)	0.018**
	CS	32 (58.2)	20 (36.4)	
Apgar score of the first minute, N (%)	**0-4**	10 (18.2)	10 (18.2)	0.897**
	5-7	12 (21.8)	14 (25.5)	
	8-10	33 (60)	31 (56.3)	
Apgar score of the fifth minute, N (%)	**0-4**	3 (5.5)	1 (1.8)	0.496**
	5-7	10 (18.2)	8 (14.5)	

	8-10	42 (76.3)	46 (83.7)	
NICU hospitalization, N (%)	**Yes**	11 (20)	14 (25.5)	0.325**
	No	44 (80)	41 (74.5)	
Cause of termination of pregnancy, N (%)	**Chorioamnionitis**	4 (7.3)	7 (12.7)	0.777**
	Fetal Distress	5 (9.1)	3 (5.5)	
	Abruption	3 (5.5)	4 (7.3)	
	Labor Pain	41 (74.5)	38 (69.1)	
	Other	2 (3.6)	3 (5.5)	
Neonatal complications, N (%)	**RDS**	12 (21.8)	9 (16.4)	0.715**
	IUGR	5 (9.1)	7 (12.7)	
	Sepsis	3 (5.5)	6 (10.9)	
	Death	2 (3.6)	1 (1.8)	
	None	33 (60)	32 (58.2)	
Maternal complications, N (%)	**Metritis**	3 (5.5)	2 (3.6)	0.855**
	Postpartum Bleeding	7 (12.7)	5 (9.1)	
	Thromboembolism	2 (3.6)	3 (5.5)	
	Death	0	0	
	None	43 (78.2)	45 (81.8)	
Age at termination of pregnancy (week), N (%)	**26-29**	11 (20)	11 (20)	0.901**
	30-33	13 (23.6)	15 (27.3)	
	34-36	31 (56.4)	29 (52.7)	
Presentation at birth, N (%)	**Cephalic**	40 (72.7)	49 (89.1)	0.073**
	Breech	10 (18.2)	5 (9.1)	
	Transverse	5 (9.1)	1 (1.8)	

RDS: Respiratory distress syndrome, IUGR: Intrauterine Growth Restriction

Discussion

In the present study, which was carried out with the aim of maternal- fetal and neonatal outcome in 26-34 weeks' pregnancies with pPROM, there was no significant difference in maternal, fetal and neonatal outcomes between the hospitalized and home care groups. The only significant difference was the higher natural birth rate of the home care group.

In the study by Senoun et al. (24), there was no evidence of differences between planned home and hospital management for chorioamnionitis, serious neonatal morbidity, gestational age at delivery, birthweight and admission to neonatal intensive care. Furthermore, results showed that women managed in hospital were more likely to be delivered by caesarean section. The results of the mentioned study were the same as the present study. Another trial study conducted in Iran showed that there was no significant difference between the hospital care group and planned home group in terms of maternal and neonatal outcomes. Only in terms of the prevalence of NICU hospitalization in the inpatients was significantly higher than outpatient mothers. The study by Garabedian et al. (25), there was no difference between the pPROM women under home care and hospital care in pregnancy complications including chorioamnionitis, delivery issue and neonatal outcome. Although the present study is observational, the results are almost the same as the present study.

In a by Hannah et al. (26), the number of 1670 women who suffered PROM at term was examined in terms of comparing the adverse effects of expectant management at home and in the hospital. Six hundred fifty-three women (39.1%) were managed at home, and 1017 (60.9%) in a hospital. Expectant management at home, might increase the likelihood of some adverse outcomes such as more prevalence of chorioamnionitis and cesarean section rate rather than in a hospital. In another study (27), the average baby weight, first- and fifth-minute Apgar scores, neonatal death, chorioamnionitis, gestational age at the time of delivery, and the interval between the pPROM and the time of delivery in the group under home care were significantly lower than in the hospitalized group. Although the results of the mentioned recent studies were contradictory to the results of the present study, it can be said that in our study, for all mothers under care at home, the necessary planning for regular visits and the possibility of emergency visits to the hospital by a perinatologist was provided, and therefore the risk of maternal and newborn complications was minimized.

Among the limitations of the present study, we can mention the high costs related to the visit and carrying out tests to check the health of the fetus outside the hospital. In order to solve this limitation, after the necessary coordination by the researcher, the mothers were asked to refer to the midwifery clinic located in the research site hospital (a government hospital) and based on health insurance if they need the mentioned items.

Conclusion

According to the results of the present study, it can be stated that low-risk mothers with pPROM can be monitored at home if care services and health education are provided and awareness of danger signs is provided.

Acknowledgments:

Conflict of interest: There is no conflict of interest

Financial support: This study was extracted from the thesis of Azam nosraty and was financially supported by the Research Council of Ahvaz Jundishapur University of Medical Sciences,in 2021 Ahvaz, Iran,

Ethics statement: This study is experimental research approved as a thesis with an Ethical code number of "IR.AJUMS.HGOLESTAN.REC.1400.628 in Ahvaz Jundishapur University of Medical Science, Ahvaz, Iran.

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