

Research Article

RELATIONSHIP BETWEEN BIRTH WEIGHT AND PREMATURE RUPTURE OF MEMBRANES: A CROSS-SECTIONAL STUDY

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Abstract

Background:

Premature rupture of membranes (PROM) is a common obstetric complication, affecting approximately 5-10% of pregnancies. It is associated with significant maternal and neonatal morbidity, particularly due to infection and preterm birth. One of the important neonatal outcomes influenced by PROM is birth weight, which directly impacts neonatal survival and morbidity.

Objectives:

To evaluate the relationship between PROM and neonatal birth weight and to assess associated maternal and neonatal outcomes.

Methods:

This analytical cross-sectional study was conducted in a tertiary care centre over one year. A total of 150 pregnant women beyond 28

weeks of gestation were included, comprising 75 PROM cases and 75 controls with intact membranes. Statistical analysis was performed using appropriate tests, with $p < 0.05$ considered significant.

Clinical evaluation, obstetric parameters, and neonatal outcomes were recorded. Birth weight was measured immediately after delivery.

Results:

The mean birth weight among neonates born to PROM mothers was significantly lower (2.64 ± 0.48 kg) compared to controls (2.89 ± 0.41 kg) ($p = 0.041$). PROM was also associated with increased NICU admissions (41.3% vs 12%, $p < 0.001$) and lower amniotic fluid index. No significant association was found between PROM and mode of delivery. Socioeconomic status showed a significant association, with a higher incidence of PROM in lower-middle-class women.

Conclusion:

PROM is significantly associated with reduced birth weight and adverse neonatal outcomes. Early identification and appropriate management of PROM are crucial to improving perinatal outcomes. Strategies targeting prevention and timely intervention may help reduce low birth weight and neonatal morbidity.

Keywords: Premature rupture of membranes, birth weight, neonatal outcome, NICU admission, obstetrics

Introduction

Premature rupture of membranes (PROM) refers to the rupture of fetal membranes before the onset of labour, irrespective of gestational age. It remains one of the most frequently encountered complications in obstetric practice and contributes significantly to maternal and neonatal morbidity.

PROM complicates approximately 5-10% of pregnancies and is particularly concerning because of its association with preterm delivery, intrauterine infection, and adverse neonatal outcomes. Among these, low birth weight is a critical determinant of neonatal morbidity and mortality, especially in developing countries.

The relationship between PROM and birth weight is multifactorial. Membrane rupture may lead to preterm labour, oligohydramnios, and intrauterine stress, all of which can adversely affect fetal growth. Additionally, infection and inflammation associated with PROM may impair placental function, further contribute to reduced fetal weight.

In resource-limited settings, where antenatal care may be suboptimal, PROM often presents

late and is associated with poor neonatal outcomes. Understanding its impact on birth weight is essential for improving perinatal care and guiding management strategies.

This study was undertaken to evaluate the association between PROM and neonatal birth weight in a tertiary care setting.

Materials and Methods

This analytical cross-sectional study was conducted in the Department of Obstetrics and Gynaecology of a tertiary care hospital over a period of one year.

A total of 150 pregnant women beyond 28 weeks of gestation were included in the study. They were divided into two groups:

Cases (PROM group): 75 women diagnosed with PROM

Controls: 75 women with intact membranes

Inclusion Criteria

Age between 20-40 years

Singleton pregnancy

Gestational age 28-40 weeks

Exclusion Criteria

Medical disorders such as hypertension, renal disease

Vaginal bleeding or infection

Congenital fetal anomalies

Intrauterine fetal demise

Data Collection

Detailed history, clinical examination, and obstetric evaluation were performed. PROM was diagnosed based on history, speculum examination, and standard clinical tests.

Neonatal birth weight was measured immediately after delivery using a calibrated weighing scale.

Outcome Measures

Primary outcome: Birth weight

Secondary outcomes: NICU admission, mode of delivery, amniotic fluid index

Statistical Analysis -

Data were analysed using appropriate statistical methods. Continuous variables were expressed as mean $\pm$ standard deviation. A p-value < 0.05 was considered statistically significant.

Results -

The demographic characteristics such as age, parity, and gestational age were comparable between the two groups, indicating that these variables did not influence the outcomes significantly.

Birth Weight -

The mean birth weight in the PROM group was 2.64 ± 0.48 kg, which was significantly lower than the control group (2.89 ± 0.41 kg) ($p = 0.041$).

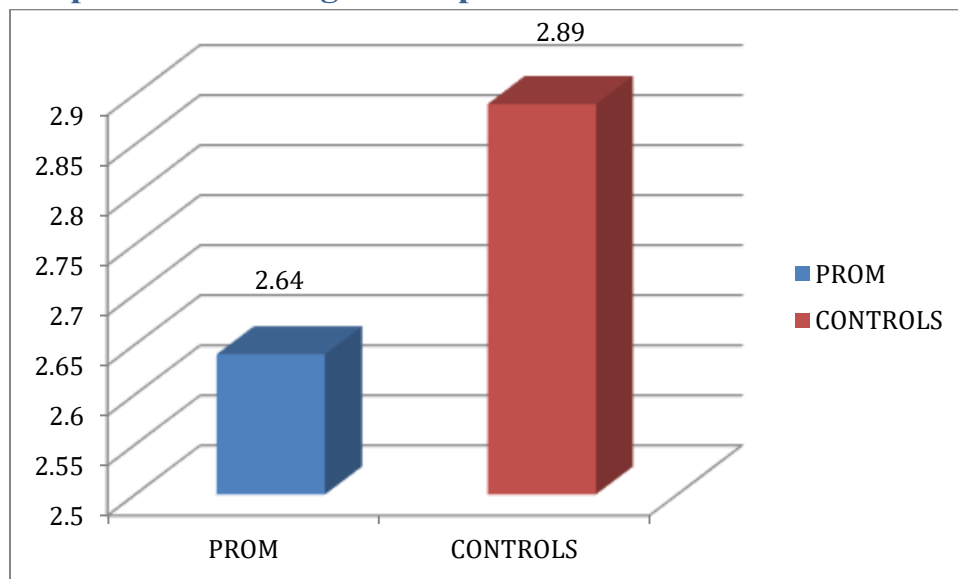
Table 1: Birth Weight Comparison

Group	Mean Birth Weight (kg)	SD
PROM	2.64	0.48
Control	2.89	0.41

Statistical Analysis

Independent t-test showed a statistically significant difference in birth weight between PROM and control groups ($p = 0.041$), indicating PROM is associated with lower birth weight.

Graph 1: Birth Weight Comparison

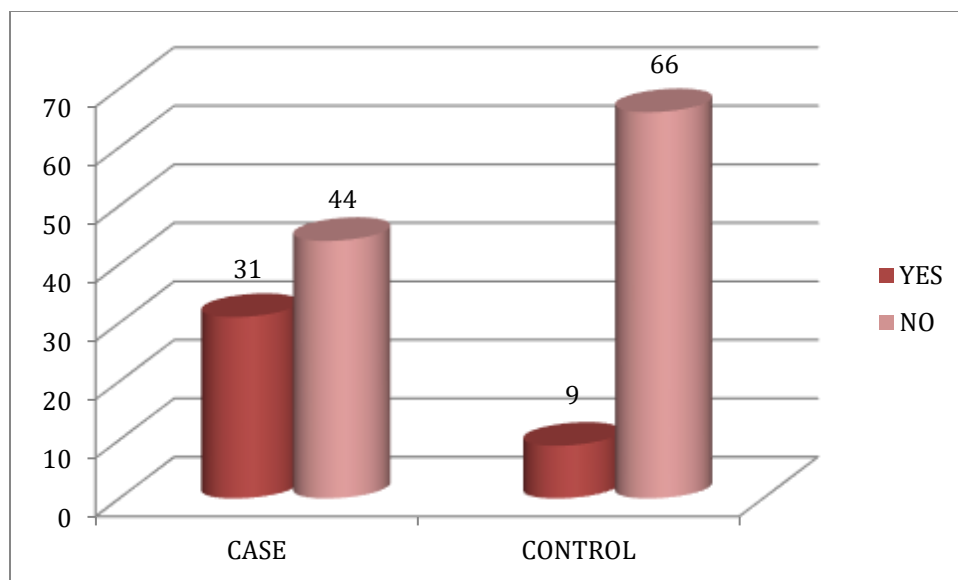


This indicates a clear association between PROM and reduced neonatal weight.

NICU Admission-

NICU admission was significantly higher among PROM cases (41.3%) compared to controls (12%) ($p < 0.001$), suggesting increased neonatal morbidity.

NICU ADMISSION	CASE	CONTROL	P value
YES	31	9	0.0001
NO	44	66	



Amniotic Fluid Index (AFI)-

PROM cases had significantly lower AFI values compared to controls, reflecting fluid loss due to membrane rupture.

AFI	PROM	Controls	P value
Normal	32	52	
Reduced	43	23	0.018

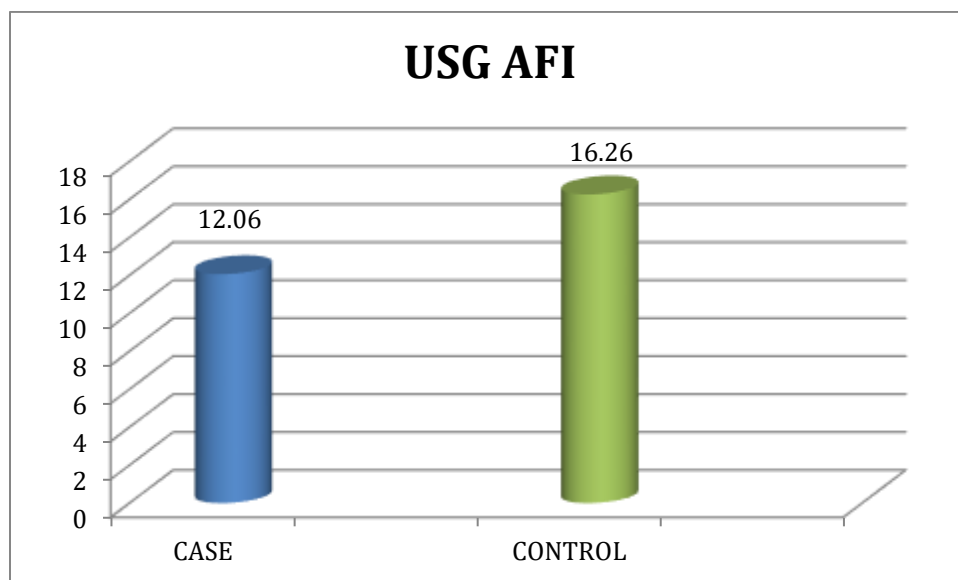


Fig : Average value of USG AFI in cases and control

Mode of Delivery-

There was no statistically significant difference in the mode of delivery between the two groups ($p = 0.624$).

Socioeconomic Status-

A higher proportion of PROM cases belonged to the lower-middle socioeconomic group, and this association was statistically significant ($p = 0.02$).

Discussion -

The present study demonstrates a significant association between PROM and reduced neonatal birth weight. Neonates born to mothers with PROM had lower mean birth weights compared to those born to mothers with intact membranes.

This finding is consistent with previous studies, which have reported that PROM contributes to low birth weight primarily through preterm delivery and intrauterine compromise. Loss of amniotic fluid following membrane rupture leads to oligohydramnios, which can impair fetal growth and increase the risk of cord compression and placental insufficiency.

In addition, PROM is frequently associated with intrauterine infection, which can trigger inflammatory pathways affecting fetal development. These mechanisms collectively explain the lower birth weights observed in PROM cases.

The study also found a significantly higher rate of NICU admissions among PROM cases. This reflects the increased risk of complications such as prematurity, respiratory distress, and neonatal sepsis.

Interestingly, the mode of delivery did not differ significantly between the groups, suggesting that PROM alone may not dictate the route of delivery unless associated with other obstetric indications.

Socioeconomic status emerged as an important factor, with higher PROM incidence among lower-middle-class women. This may be attributed to factors such as poor nutrition, inadequate antenatal care, and increased prevalence of infections.

Overall, the findings highlight the clinical importance of PROM as a determinant of adverse neonatal outcomes, particularly low birth weight.

Conclusion

PROM is significantly associated with reduced neonatal birth weight and increased neonatal morbidity. Early diagnosis and timely management are essential to minimize adverse outcomes.

Improving antenatal care, early identification of high-risk cases, and appropriate obstetric interventions can help reduce the burden of low birth weight and improve neonatal survival.

PROM should be considered an important risk factor for poor neonatal outcomes, and efforts should be made to address modifiable risk factors, especially in resource-limited settings.

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