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Acute and Chronic Respiratory Diseases in Pregnancy: Associations with Spontaneous Premature rupture of Membranes

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A B S T R A C T

Background: Acute respiratory diseases, such as pneumonia or influenza, are known to cause significant maternal and fetal morbidity and can exacerbate underlying chronic respiratory conditions. Chronic respiratory diseases, such as asthma and COPD, require careful management during pregnancy to avoid complications.

Objective: To determine the association of spontaneous premature membranes with acute and chronic respiratory diseases.

Methodology: The current cross-sectional study was conducted at the Department of Gynecology Jinnah International Hospital and Ayub Teaching Hospital, Abbottabad for the period of 6 months from January 2021 to May 2021 after approval from the ethical review board. The respiratory diseases were divided into two types one was acute conditions such as acute viral and bacterial respiratory pneumonia along with acute bronchitis. Additionally, the second type was chronic conditions like asthma in addition to chronic bronchitis. The collected was thoroughly analyzed by the SPSS 23 version.

Results: The present consists of 348 pregnant females with the age from 18 to 41 years of age. The participants had singleton pregnancies. The females who were from 18-23 years of age had 34 (22.97%) acute conditions, along with 57 (28.5%) chronic conditions. The acute 68 (45.94%) and chronic 78 (39%) conditions were more prevalent from 24-29 years of age. There was a total of 51 (34.45%) pre-term births with PROM and 97 (65.54%) without premature rupture of the membrane (PROM) among the females with acute conditions, furthermore, those with chronic conditions had 128 (64%) pre-term births with PROM and 72 (36%) had without PROM.

Conclusion: The current study concluded that both acute and chronic conditions were associated with spontaneous premature rupture of membrane; however, PROM was common among patients having chronic conditions such as asthma and chronic bronchitis.

Keywords: Premature Rupture of Membrane; Acute and Chronic Respiratory Diseases; Asthma; Chronic Bronchitis

Introduction

Spontaneous premature rupture of membranes (PROM) is a significant obstetric complication characterized by the rupture of the fetal membranes before the onset of labor. Three percent of deliveries result in preterm premature rupture of the membranes (PPROM).[1] According to reports, respiratory distress syndrome (RDS) is an especially frequent and dangerous consequence that follows premature delivery. It is also recognized as a risk associated with cerebral palsy.[2,3] Previous studies showed that 55.4% of babies delivered to moms with PPROM experienced RSD. premature babies who have cesarean delivery (CD) run the risk of developing respiratory distress syndrome (RDS). Additional risk variables include infant weight loss, mother multiparity, male gender, and particularly pre-pregnancy body mass index (BMI).[4-6] Preterm premature rupture of membranes (pPROM) refers to ruptures prior to the 37th week of pregnancy, but the term early rupture of membrane (tPROM) describes the breakdown of the membrane beyond that time. Approximately 2 - 4% of singleton deliveries and 7 - 20% of pregnancies with multiple pregnancies are affected by pPROM.[7,8] Approximately 30–40% of premature babies have pPROM which continues to be a significant issue in perinatal care.[9]

The respiratory system undergoes physiological changes during pregnancy, including increased oxygen consumption, elevated diaphragm position due to the enlarging uterus, and heightened susceptibility to respiratory infections. These changes, combined with immune system modulation during pregnancy, can lead to a higher prevalence of respiratory diseases among pregnant women. Common respiratory conditions such as asthma, bronchitis, pneumonia, and chronic obstructive pulmonary disease (COPD) can pose risks to both the mother and the developing fetus.

Acute respiratory diseases, such as pneumonia or influenza, are known to cause significant maternal and fetal morbidity and can exacerbate underlying chronic respiratory conditions. Chronic respiratory diseases, such as asthma and COPD, require careful management during pregnancy to avoid complications.

One of the most frequent causes of infant respiratory failure and neonatal mortality is RDS The fundamental cause of RDS is lung development a lack of maturity which results in insufficient lung surfactant synthesis.[10] Pregnant women with lower socioeconomic backgrounds, physiological alterations, prompt gestational age, an intrauterine infection, insufficient prenatal care, and dietary habits, bleeding from the vagina cigarette smoking while pregnant, and sexually transmitted diseases are just a few of the many risk factors for Preterm rupture of membranes (PROM) instead of Postpartum obesity. A primary causative element in the pathophysiology and associated morbidity experienced by mothers and newborns in postpartum hemorrhage of pregnancy has been identified as subclinical intrauterine infection. Reducing the likelihood of PROM is mostly dependent on education, particularly in underdeveloped nations.[11,12]

The interaction between respiratory diseases and PROM can be multifaceted. On one hand, acute respiratory infections can lead to systemic inflammation, which has been implicated in PROM through the weakening of fetal membranes. On the other hand, chronic respiratory diseases might contribute to PROM through factors such as prolonged medication use, reduced placental blood flow, or direct inflammation of the fetal membranes.

With bacterial infections along with increased levels of proinflammatory cytokines, it is hypothesized that both acute as well as ongoing respiratory illnesses are linked to a higher risk of sudden PROM. To test this hypothesis, we thus looked at the relationship between acute and chronic respiratory problems and spontaneous premature rupture of the membranes using an important based on population dataset of single births.

Understanding the links between respiratory diseases and PROM is crucial for clinicians and public health professionals to develop effective preventive and management strategies. This knowledge could inform better screening practices, targeted interventions, and comprehensive prenatal care to reduce the incidence of PROM and its associated complications. Moreover, identifying high-risk groups among pregnant women with respiratory conditions could lead to more personalized care, potentially improving outcomes for both mothers and their infants.

Objective

To determine the association of spontaneous premature membranes with acute and chronic respiratory diseases.

Methodology

The current cross-sectional study was conducted at the Department of Gynecology Jinnah International Hospital and Ayub Teaching Hospital Abbottabad for the period of 6 months from January 2021 to May 2021 after approval from the ethical review board. A total of 348 single-tone pregnant females were selected for the study through a simple random sampling technique based on the prevalence of respiratory among pregnant women. The respiratory diseases were divided into two types one was acute conditions such as acute viral and bacterial respiratory pneumonia along with acute bronchitis. Additionally, the second type was chronic conditions like asthma in addition to chronic bronchitis. Informed consent was from each participant and they were ensured that their confidentiality and anonymity would be maintained throughout the study. All the data was

Table 1. Sociodemographic characteristics of the study cases

Maternal characteristics	Number of Births	Acute conditions	Chronic conditions
Age (years)			
18 - 23	88 (25.28%)	34 (22.97%)	57 (28.5%)
24 - 29	138 (39.65%)	68 (45.94%)	78 (39.0%)
30 - 35	71 (20.40%)	28 (18.91%)	39 (19.5%)
36 - 41	51 (14.65%)	18 (12.16%)	26 (13.0%)
Prenatal care Adequacy			
Adequate	128 (36.78%)		
Inadequate	220 (63.21%)		

collected regarding their pregnancy period whether PROM occurred before 37 weeks or not while in association with their respiratory like acute and chronic. The collected was thoroughly analyzed by the SPSS 23 version.

Results

The present consists of 348 pregnant females with the age from 18 to 41 years of age. The participants had single-ton pregnancies. The females who were from 18-23 years of age had 34 (22.97 %) acute conditions, along with 57 (28.5 %) chronic conditions. The acute 68 (45.94 %) and chronic 78 (39 %) conditions were more prevalent from 24-29 years of age. Moreover, 128 (36.78 %) of them had adequate and 220 (63.21 %) had inadequate prenatal care (Table 1).

Table 2 highlights, the distribution of term and pre-term delivery among acute and chronic conditions**.** There was a total of 51 (34.45 %) pre-term births with PROM and 97 (65.54 %) without PROM among the females with acute conditions, furthermore, those with chronic conditions had 128 (64 %) pre-term births with PROM and 72 (36 %) had without PROM.

Discussion

Preterm Pre-labor rupture of membranes (PPLROM) refers to women who report PROM earlier than 37 weeks of pregnancy. PLROM is referred to as an unintentional breach of the membrane earlier the expected commencement of labor. For individuals who have premature membrane ruptures between 14 and 26 weeks of pregnancy, mid-trimester PROM is applicable.[13] According to research, PPLROM affects between 2 and 4% of pregnancies with a singleton and between 7% and 20% of pregnancies with twins.[14] In the present study, The females who were from 18-23 years of age had 34 (22.97 %) acute conditions, along with 57 (28.5 %) chronic conditions. The acute 68 (45.94 %) and chronic 78 (39 %) conditions were more prevalent from 24-29 years of age. Moreover, 128 (36.78 %) of them had adequate and 220 (63.21 %) had inadequate prenatal care. Another comparable study conducted by Acute as well as chronic respiratory disorders occurred at a rate of 2.1 and 9.5 per 1000 deliveries, accordingly, while the prevalence of PROM was 5%. A lower incidence of PROM was linked to chronic bronchitis (RR 0.39, 95% CI 0.31, 0.48). During premature (RR 1.15, 95% CI 1.14, 1.17), as well as term (RR 1.27, 95% CI 1.23, 1.30), asthma was strongly linked

Table 2. Distribution of Term and Pre-term delivery among Acute and Chronic conditions

Condition	Pre-term births with PROM	Pre-term births without PROM
Acute conditions	51 (34.45%)	97 (65.54%)
Chronic condition	128 (64.0%)	72 (36.0%)

to PROM. Acute upper respiratory illness was linked to premature babies in whites (RR 1.90, 95% CI 1.71, 2.11) along with blacks (RR 6.76, 95% CI 5.67, 8.07), according to classification by race. In racial groups term PROM as well as premature delivery PROM was linked to viral/ bacterial pneumonia as well. The phrase PROM was linked to asthma in black people, yet not in white people.[15] Similarly, in our, there was a total of 534.45 % pre-term births with PROM and 65.54 % without PROM among the females with acute conditions, furthermore, those with chronic conditions had 64 % pre-term births with PROM and 36 % had without PROM. In addition, according to Carroll KN et al in contrast to our results, the research found a correlation between maternal asthma and the incidence of preterm labor and delivery (OR 1.63, 95% CI 0.50, 5.33). Nevertheless, a closer look at our data reveals that only black women correlated asthma and spontaneous PROM at length gestation periods. Asthma distribution, and degree of severity, including death have grown over the past 10 years despite breakthroughs in medication and understanding of putative risk variables and pathophysiologic processes.[16] Another comparable research showed that the pPROM incidence was 3,07%, which is comparable to the value reported in the available research.[17] According to a DARIOS GETAHUN research, there was a 5% incidence of PROM and 2.1 and 9.5 cases of acute and chronic respiratory disorders per 1000 pregnancies, correspondingly. There was a correlation between a lower risk of PROM and chronic bronchitis. PROM at both preterm and term was substantially correlated with asthma.[18] In contrary to our findings, another study done by Sorensen et al. reported no association between the risk of preterm PROM and maternal asthma.[19]

Conclusion

Based on the study's findings, there is a significant relationship between respiratory diseases and the occurrence of spontaneous premature rupture of membranes (PROM) in pregnancy. Specifically, it was observed that both acute respiratory conditions (like infections) and chronic respiratory diseases (such as asthma and chronic bronchitis) are associated with an increased risk of PROM.

Furthermore, the study noted that the risk of PROM was particularly higher among patients with chronic respiratory conditions like asthma and chronic bronchitis. This suggests that these chronic conditions might play a more substantial role in influencing pregnancy outcomes, particularly regarding membrane rupture. Consequently, healthcare providers should consider respiratory health as a factor in prenatal care and monitor pregnant patients with these chronic respiratory diseases more closely to manage and potentially mitigate the risk of PROM. Superadded acute respiratory infections are also more common in patients with background of chronic respiratory disaeses.

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