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Study of Factors Contributing to the Increasing Incidence of Pneumonia during Pregnancy

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A B S T R A C T

Background: The introduction of antibiotic therapy has significantly altered the severe complications associated with pneumonia during pregnancy. Prior to the antibiotics used, preterm labor and maternal mortality were common outcomes of pneumonia.

Objective: The present study aimed to determine the factors contributing to the rising incidence of pneumonia during pregnancy.

Methodology: This retrospective study was conducted on 36 pneumonia cases among 3468 deliveries investigated in the Obstetrics and Gynecology Department of Lady Willingdon Hospital, Lahore - Pakistan from January 2019 to August 2021. Various risk factors for the development of pneumonia during pregnancy included: Pseudomonas aeruginosa, No pathogen identified, Streptococcus pneumonia, Pneumocystis carinii, Haemophilus influenzae, Influenza A, and Inadequate microbiologic evaluation. Medical and obstetric complications of each patient were evaluated and recorded.

Results: The overall mean age of 36 pneumonia cases was 27.8±6.84 years with an age range 20 to 45 years. The incidence of pathogens responsible for pneumonia such as Pseudomonas aeruginosa, No pathogen identified, Streptococcus pneumonia, Pneumocystis carinii, Haemophilus influenzae, Influenza A, and Inadequate microbiologic evaluation was 5.6% (n=2), 38.9% (n=14), 19.4% (n=7), 5.6% (n=2), 11.1% (n=4), 5.6% (n=2), and 8.3% (n=5) respectively. The incidence of different medical complications such as atrial fibrillation, respiratory failure necessitating mechanical ventilation, empyema, and bacteremia was 5.6% (n=2), 22.2% (n=8), 8.3% (n=3), and 13.9% (n=5) respectively. Preterm delivery and labor were the obstetric complications found in 38.9% (n=14) and 44.4% (n=16) respectively.

Conclusion: Streptococcus pneumonia was the most prevalent risk factor for pneumonia development during pregnancy. Respiratory failure was the major medical condition found in pneumonia patients. Despite advanced antimicrobial, tocolytic, and supportive treatments, medical and obstetric complications still occur regularly. Maternal conditions such as cystic fibrosis and immunodeficiency syndrome are related to obstetric complications like preterm delivery and mortality.

Keywords: Pneumonia; Pregnancy; Obstetric Complications

Introduction

Pneumonia presenting as pulmonary fibrosis represents an important non-reproductive infection that can occur during pregnancy.[1] The introduction of antibiotics dramatically changed the serious complications associated with prenatal pneumonia. In the era of antibiotics, preterm birth and maternal death were common outcomes of pneumonia.[2] Since the advent of antibiotics, maternal mortality has decreased dramatically. However, the effect of antibiotics on the incidence of preterm labor has been inconsistently reported, with some studies reporting a decrease and others reporting no significant change.[3] An earlier study reported that increasing prevalence of pneumonia is significantly associated with higher mortality rate among pregnant women.[4] In general, pregnant women diagnosed with pneumonia are hospitalized for observation and initial treatment due to potential complications such as pericarditis, empyema, and meningitis. Preterm birth, insufficient supply of oxygen, and low birth weight were different obstetric complications leading to the fetal distress.[5] Recently, community-acquired pneumonia in adults has expanded to include several "new" pathogens, such as Legionella pneumophila, Pneumocystis carinii, and Chlamydia psittaci TWAR strain.[6] Moreover, pneumonia outbreaks so due to Gram-negative bacteria and increased, while Streptococcus -Pneumonia and Staphylococcus aureus outbreaks were observed decreased.[7]

Pneumonia cases during pregnancy increase with frequently found respiratory infections faced in these patients. Women with chronic respiratory infections, whose immune systems are compromised due to infection, malignancy, or chemotherapy, are now surviving into their reproductive age. Respiratory infections prevalence in this population may increase pneumonia in pregnancy. These cases may differ from community-acquired pneumonia commonly described in adults. The impact of this particular group of patients on the frequency and types of pneumococcal infection in offspring has yet to be systematically elucidated. Previous studies of pneumococcal disease in pregnancy were conducted before the diagnosis of rare infections zeal causing pneumonia or were only isolated case reports were available.[8-11] There is paucity of data on pneumonia being the cause for obstetric complications among pregnant women. Therefore, the present study was conducted to determine the factors contributing to the rising incidence of pneumonia during pregnancy.

Objective

The present study aimed to determine the factors contributing to the rising incidence of pneumonia during pregnancy.

Methodology

About 36 pneumonia patients among 3468 deliveries cases were retrospectively investigated in the Department of Obstetrics and Gynecology Department of Lady Willingdon Hospital, Lahore - Pakistan from January 2019 to August 2021. Pneumonia characteristics, outcome variables, and exposure variables were studied. Premature labor, trimester, delivery, and birth weight were pregnancy-related outcome variables. Disease severity, cultured organisms, rate of recovery, and radiographic findings were different characteristics of pneumonia. HIV status, hematocrit, drug, and pneumonia associated medical conditions were different exposure variables examined. Pseudomonas aeruginosa, streptococcus pneumonia, influenza A, and Pneumocystis carinii were different risk factors that develop pneumonia during pregnancy. Medical and obstetric complications of each patient were evaluated and recorded.

SPSS version 27 was used for descriptive statistics. Quantitative variables age, gestational age, and birth weight were expressed as mean and standard deviation whereas qualitative variables were described as

Table 1. Demographic details of patients

Parameters	Value [(Mean ± SD)] N (%)
Age (years)	27.8 ± 6.84
Parity	1.4 ± 1.4
Gravidity	3.5 ± 2.2
Gestational Age (weeks)	36.1 ± 4.1
Hospitalization (days)	9.0 ± 6.3

frequency and percentage. Chi square test, and student t-test was used for statistical comparison with $p<0.05$ as statistical significant.

Results

The overall mean age was 27.8±6.84 years (20-45 years). Mean value of gestational age, parity, gravidity, and hospital stay was 36.1 ± 4.1 weeks, 1.4 ± 1.4, 3.5 ± 2.2, and 9.0 ± 6.3 days respectively. About 38.9% cases had no identifiable pathogen. Streptococcus pneumonia was the most prevalent risk factor for the development of pneumonia found in 19.4% cases followed by Haemophilus influenza 11.1% and Haemophilus influenza, Influenza A, and Pneumocystis carinii found in 5.6% cases. Arterial fibrillation, respiratory failure necessitating mechanical ventilation, empyema, and bacteremia are different medical comorbidities found in 5.6% (n=2), 22.2% (n=8), 8.3% (n=3), and 13.9% (n=5) respectively. The incidence of major complications were preterm delivery and preterm labor found in 38.9% and 44.4% respectively. Demographic details and clinical characteristics are shown in Table-I. Risk factors in terms of pathogens for the development of pneumonia among pregnant women are depicted in Figure-1. The incidence of various medical and obstetric complications are illustrated in Figure-2.

Discussion

The present study mainly focused on the investigation of various factors contributing to the increasing prevalence of pneumonia during pregnancy and found that streptococcus pneumonia was the most prevalent risk factor for pneumonia development during pregnancy. Respiratory failure was the major medical condition found in pneumonia patients. Despite advanced antimicrobial, tocolytic, and supportive treatments, medical and obstetric complications still occur regularly. Maternal conditions such as cystic fibrosis and immunodeficiency syndrome are related to obstetric complications like preterm delivery and mortality. Pneumonia poses a considerable risk of fatal non-obstetric infection in pregnant patients. Despite the use of effective antimicrobial treatments, the risks of preterm labor and perinatal complications persist significantly.[12-14]

In the present study, majority of pregnant women suffering from chronic respiratory conditions were caused by drug addiction. Sepsis and multiple infections were effectively treated by intravenous antibiotic in seriously ill patients.[15] The independent risk factor for the development of pneumonia during pregnancy was the preterm delivery, which resemble the finding of an earlier study.[16] Mathad et al. reported that the incidence of preterm labor was 43% among studied pneumonia cases.[17] Globally, the reported incidence of preterm delivery varied from 8% to 12%.[18,19] Cervical disease, endocrine disorders, intrauterine infection, and hemorrhage are possible risk

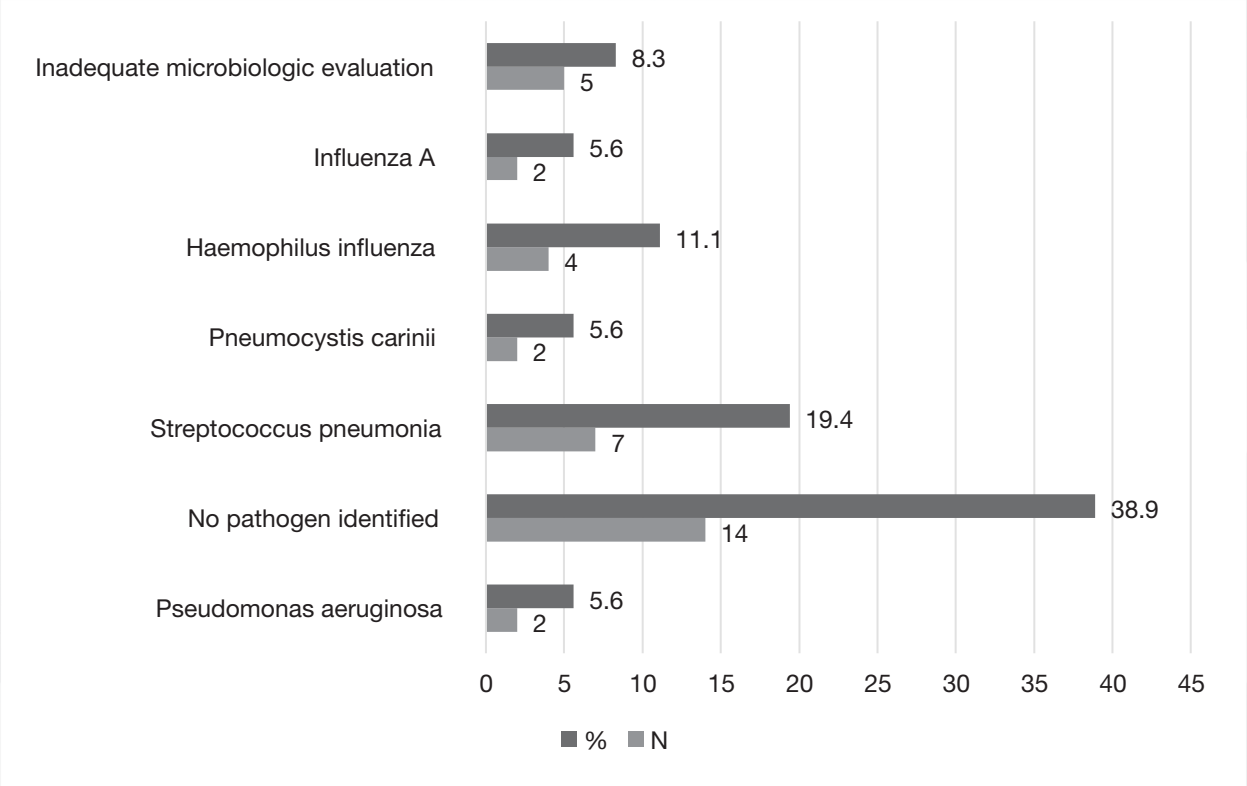

Figure 1. Risk factors in terms of pathogens for the development of pneumonia among pregnant women (N=36)

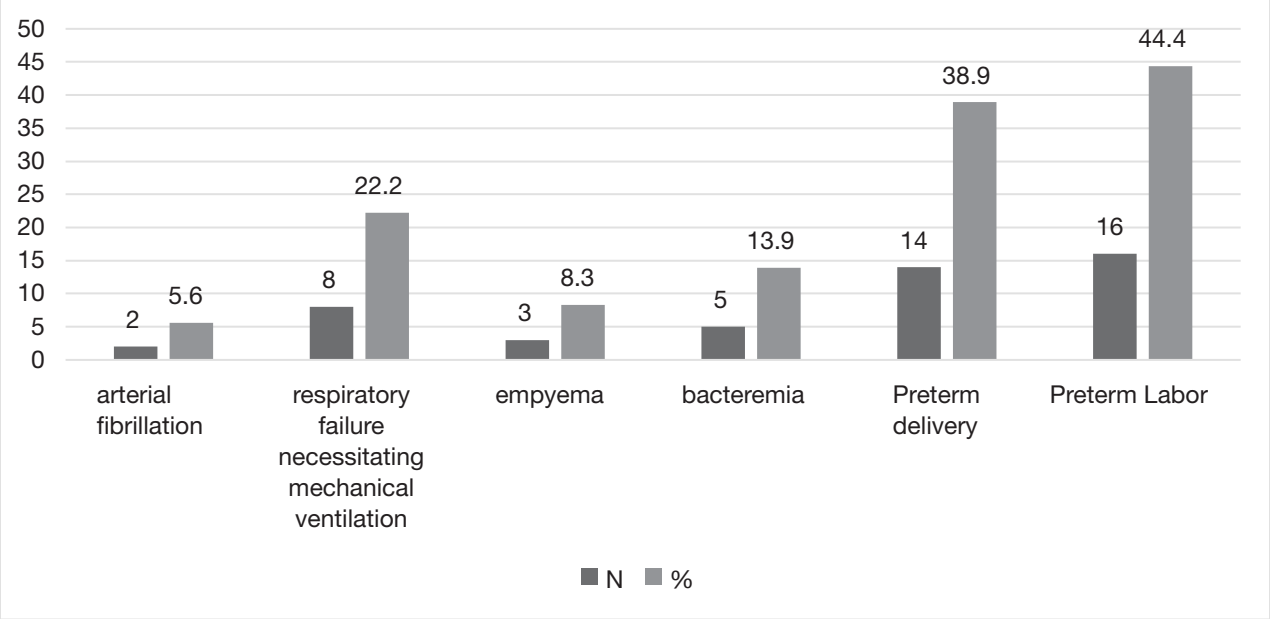

Figure 2. incidence of various medical and obstetric complications (N=36)

factors for preterm labor. The increasing production of different enzymes caused by pro-inflammatory cytokines and microbial endotoxins were implicated in both term and preterm labor mechanisms.

Fever and pneumonia has been associated with higher incidence of low birth weight (LBW).[20] Likewise, the incidence of LBW (<2.5kg) was significantly higher (16%) in pneumonia cases against control 8% cases.[21] An earlier study reported that low birth weight was significantly lower in pneumonia affected pregnancy patients as compared to control cases.[22]

Obstetric complications such as low Apgar score and IUGR were significantly associated with pneumonia during pregnancy. The increasing incidence of low birth weight and preterm labor are caused by these complications.[23] Similar to Morris et al.'s study, Streptococcus pneumonia was the most frequently identified pathogen in our patient cohort.[24]

The frequency of pneumococcal pneumonia might be underestimated because this organism is fastidious and may not always grow in sputum cultures. Due to organism colonization in sputum, the prevalence of Streptococcus pneumonia varied from 34% to 61%.[25,26] The evaluation process could involve blood cultures and gram staining. In some cases, more invasive diagnostic methods like bronchoscopy might be necessary.

Conclusion

Streptococcus pneumonia was the most prevalent risk factor for pneumonia development during pregnancy. Respiratory failure was the major medical condition found in pneumonia patients. Despite advanced antimicrobial, tocolytic, and supportive treatments, medical and obstetric complications still occur regularly. Maternal conditions such as cystic fibrosis and immunodeficiency syndrome are related to obstetric complications like preterm delivery and mortality.

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