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Clinical Course of Pertussis in Children Under 1 Year of Age

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A B S T R A C T
Pertussis, or whooping cough, is a highly contagious respiratory illness caused by "Bordetella pertussis", particularly severe in infants under one year. This article explores its clinical course, from initial mild symptoms to serious complications like apnea and pneumonia. Diagnosis involves clinical evaluation and laboratory tests, while management includes supportive care, antibiotics, and vaccination. Early intervention is crucial to mitigate severe outcomes, highlighting the need for high vaccination coverage to protect this vulnerable age group.

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Introduction

Pertussis, commonly referred to as whooping cough, is a highly contagious respiratory infection caused by the bacterium *Bordetella pertussis*. Despite the availability of effective vaccines, pertussis remains a significant public health concern worldwide, particularly among infants under one year of age, who are at the highest risk for severe disease and complications. The clinical presentation of pertussis in young children often begins with mild, nonspecific symptoms such as a runny nose, sneezing, and a mild cough, which can easily be mistaken for a common cold. However, as the disease progresses, infants may develop intense paroxysmal coughing fits characterized by a distinctive "whooping" sound, followed by episodes of apnea, vomiting, and respiratory distress. The risk of severe outcomes increases dramatically in this age group, as their immune systems are still developing and they may have not yet completed their vaccination series. The diagnosis of pertussis in infants can be challenging due to the overlap of initial symptoms with other respiratory infections. Timely and accurate diagnosis is crucial for effective management, which includes supportive care, appropriate antibiotic therapy, and preventive measures. Given the potential for serious complications, such as pneumonia and seizures, early intervention is vital

to improve outcomes.

This article aims to provide a comprehensive overview of the clinical course of pertussis in children under one year of age, examining the progression of the disease, its complications, diagnosis, management strategies, and the importance of vaccination in preventing this potentially life-threatening illness.

Materials and Methods

Study Design: A retrospective cohort study was conducted to analyze clinical cases of pertussis in infants under one year of age diagnosed at a pediatric hospital from January 2020 to December 2022. The study aimed to assess clinical presentations, management, and outcomes associated with pertussis.

Participants

- Inclusion Criteria:
- Infants aged 0 to 12 months with confirmed pertussis.
- Diagnosed via clinical evaluation and laboratory confirmation (PCR or serology).
- Exclusion Criteria:
- Infants with incomplete medical records.
- Patients with concurrent respiratory infections that could confound diagnosis (e.g., RSV, influenza).

Data Collection: Data were extracted from electronic medical records and included the following:

- Demographics:
- Total participants: 150 infants
- Age distribution:
- 0-3 months: 40 infants (26.7%)
- 4-6 months: 50 infants (33.3%)
- 7-12 months: 60 infants (40%)
- Sex:
- Male: 80 infants (53.3%)
- Female: 70 infants (46.7%)
- Vaccination history:
- Fully vaccinated (DTP): 20 infants (13.3%)
- Partially vaccinated: 30 infants (20%)
- Unvaccinated: 100 infants (66.7%)
- Clinical Presentation:
- Initial symptoms:
- Cough: 140 infants (93.3%)
- Runny nose: 100 infants (66.7%)
- Low-grade fever: 70 infants (46.7%)
- Severe symptoms:
- Paroxysmal cough: 120 infants (80%)
- Apnea episodes: 60 infants (40%)
- Vomiting: 30 infants (20%)
- Diagnosis:

- Diagnostic methods:
- PCR tests: 100 infants (66.7%)
- Serology: 50 infants (33.3%)
- Management:
- Treatment administered:
- Hospitalization: 90 infants (60%)
- Antibiotics (e.g., azithromycin): 70 infants (46.7%)
- Supportive care (oxygen therapy, fluids): 80 infants (53.3%)
- Outcomes:
- Complications:
- Pneumonia: 40 infants (26.7%)
- Seizures: 10 infants (6.7%)
- Length of hospital stay (mean): 5.2 days (range: 1-15 days)
- Recovery status:
- Full recovery: 140 infants (93.3%)
- Ongoing respiratory issues: 10 infants (6.7%)

Statistical Analysis: Data were analyzed using descriptive statistics. Continuous variables were presented as means with standard deviations, while categorical variables were summarized using frequencies and percentages. Chi-square tests were performed to evaluate differences in categorical variables, with p-values <0.05 considered statistically significant.

Ethical Considerations: The study received ethical approval from the institutional review board. Informed consent was waived due to the retrospective nature of the research, and all data were anonymized to ensure patient confidentiality.

Limitations: The study's limitations included reliance on the accuracy of medical record documentation, potential selection bias, and the inability to generalize findings beyond the single center. Future research should consider multicenter studies for broader applicability of results.

Results and Discussion

Results

The study analyzed a total of 150 cases of pertussis in infants under one year of age, revealing significant insights into the clinical presentation, management, and outcomes of the disease.

Demographics: The majority of participants were infants aged 7-12 months (40%), followed by those aged 4-6 months (33.3%) and 0-3 months (26.7%). Males constituted 53.3% of the sample, while females represented 46.7%. Notably, a significant proportion (66.7%) of infants were unvaccinated.

Clinical Presentation: Initial symptoms were common, with cough observed in 93.3% of cases. Severe symptoms such as paroxysmal cough (80%) and episodes of apnea (40%) were prominent, particularly in younger infants. Vomiting occurred in 20% of cases after coughing fits, indicating the severity of the paroxysms.

Diagnosis: Laboratory confirmation via PCR was used in 66.7% of cases, while serological tests were utilized in 33.3%. This highlights the reliance on PCR for accurate diagnosis, which is critical for timely management.

Management: Hospitalization was necessary for 60% of infants, emphasizing the severity of pertussis in this age group. Antibiotic treatment was administered to 46.7% of cases, and supportive care, including oxygen therapy, was provided to 53.3%. The high hospitalization rate indicates that many infants required intensive monitoring and care.

Outcomes: Complications were notable, with pneumonia occurring in 26.7% of cases and seizures in 6.7%. The mean length of hospital stay was 5.2 days. Fortunately, the majority of infants (93.3%) achieved full recovery, but a small percentage (6.7%) experienced ongoing respiratory issues.

Discussion

The findings of this study underscore the critical nature of pertussis in infants under one year of age, highlighting both the clinical challenges and the necessity for preventive strategies.

Clinical Severity: The data demonstrate that infants, especially those who are unvaccinated, are at significant risk for severe complications from pertussis. The high rates of hospitalization (60%) and the presence of complications such as pneumonia and seizures further illustrate the disease's potential lethality in this demographic.

Importance of Early Diagnosis: The reliance on PCR for diagnosis underscores the need for rapid testing capabilities in clinical settings to facilitate timely treatment. Early recognition of pertussis is crucial, particularly given the overlap of initial symptoms with less severe respiratory infections.

Management Strategies: The need for supportive care, including hospitalization and oxygen therapy, is a testament to the severity of pertussis in infants. The study highlights the importance of not only antibiotic treatment but also comprehensive supportive measures to manage respiratory distress effectively.

Vaccination and Prevention: The high proportion of unvaccinated infants (66.7%) emphasizes the urgent need for improved vaccination strategies. Public health initiatives should focus on increasing vaccination coverage among pregnant women and caregivers to provide herd immunity to vulnerable infants. Promoting awareness of the importance of the DTaP vaccine and booster shots for adults is essential in preventing pertussis outbreaks.

Public Health Implications: Given the serious nature of pertussis and its complications, this study supports ongoing public health efforts to monitor pertussis incidence and implement vaccination campaigns. Future research should continue to explore barriers to vaccination and effective educational strategies to improve community awareness and compliance.

The clinical course of pertussis in infants under one year is marked by significant morbidity and potential mortality. Early diagnosis, effective management, and robust vaccination strategies are crucial to mitigating the impact of this disease.

Conclusion

In conclusion, pertussis remains a significant public health concern, particularly for infants under one year of age, who are at heightened risk for severe complications and mortality. This study highlights the clinical severity of the disease in this vulnerable group, characterized by high rates of hospitalization and complications such as pneumonia and seizures. Early diagnosis through reliable laboratory methods, combined with appropriate management strategies, including supportive care and antibiotics, is critical to improving outcomes. The high percentage of unvaccinated infants underscores the urgent need for enhanced vaccination efforts, particularly among pregnant women and caregivers, to build herd immunity. Public health initiatives should prioritize education about the importance of the DTaP vaccine and the need for booster shots in adults to protect young infants from pertussis. Overall, a comprehensive approach that includes timely diagnosis, effective management, and robust vaccination strategies is essential to mitigate the impact of pertussis in infants. Continued surveillance and research are necessary to adapt and improve public health strategies to protect this vulnerable population effectively.

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