A Study on Etiology and Outcome of Persistent Pneumonia in Children in a Tertiary Care Centre in Bhagalpur.

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ABSTRACT
Objective: To identify the underlying causes of persistent pneumonia in children. Methods: 82 cases with persistent pneumonia were investigated (biochemical, microbiological, histopathological, immunological and radiological tests) to find out the underlying cause. Results: 2 patients had tuberculosis, 4 had acute bronchitis, 4 had foreign body aspiration, 24 had aspiration due to gastroesophageal reflux disease or oil instillation, 6 had pulmonary tuberculosis, 6 had immunodeficiency due to HIV infection, 4 had congenital lung malformation, 4 had cardiac disorders and two had foreign body aspiration as causes of persistent pneumonia. The etiology could not be established in two cases. Conclusion: In the present study, most common underlying cause of persistent pneumonia were persistent infection followed by aspiration and acquired immunodeficiency.

KEYWORDS: Children; Persistent pneumonia; Oil instillation pneumonia; Tuubercolusis; HIV infection.

INTRODUCTION
Pneumonia is a major problem in children; the World Health Organization (WHO) estimated that pneumonia occurred in approximately 156 million children (151 million in developing countries and 5 million in developed countries). [1] Pneumonia is the top infectious killer of children under 5 years worldwide, resulting in 935,000 deaths each year. [2] Lower respiratory tract infection (LRTI)/pneumonia is the most common cause of childhood morbidity and mortality, surpassing the death due to diarrhea in developing countries. [3] Non-resolving pneumonia or persistent pneumonia in children pose a significant challenge to the pediatricians and respiratory physicians. Persistent pneumonia (PP) is defined as the persistence of symptoms and radiographic abnormalities in a child with LRTI for more than a month despite a course of antibiotic therapy for 10 days. [4, 5, 6] Though many investigators have accepted this definition, some authors still prefer to use a cut-off of longer duration. [7]

Objective of the present study was to identify the causes and the contributing factors of persistent pneumonia in children. Very few studies in medical literature have reported on the etiology and the course of persistent pneumonia in children. Moreover, most studies available in literature have described persistent and recurrent pneumonia as a single entity. [8, 9] Therefore there is a need for clarity on Persistent Pneumonia in children, hence the present study was conducted in order to guide the Pediatricians in our region to prevent and control this disease.

MATERIALS AND METHODS:
This prospective study was conducted in the department of pediatrics, Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), Pondicherry, India. Persistent pneumonia cases (2 months – 11 years with a mean age of 3.3 years at the time of presentation. Out of 82 cases 54 were males (65.8%) and 28 were females (34.2%) with a male to female ratio of 1.9:1. Most of the cases were underweight with a BMI of 82 cases 54 were males (65.8%) and 28 were females (34.2%) with a male to female ratio of 1.9:1. Most of the cases were underweight with a BMI of
Acinetobacter 2 (2.4) 2 (2.4) 2 (2.4) 0 (0) 0 (0)
Enterobacteria 2 (2.4) 0 (0) 0 (0) 0 (0) 0 (0)
Klebsiella 0 (0) 0 (0) 2 (2.4) 0 (0) 4 (4.9)
Hemophilis influenza. B 0 (0) 0 (0) 0 (0) 2 (2.4) 2 (2.4)
Escherichia coli 0 (0) 0 (0) 0 (0) 0 (0) 0 (0)
Pneumocystis carinii 0 (0) 0 (0) 0 (0) 0 (0) 0 (0)
Mixed flora 0 (0) 8 (9.8) 8 (9.8) 0 (0) 0 (0)
Sterile 74 (90.3) 0 (0) 0 (0) 0 (0) 4 (4.9)
Not done 0 (0) 66(80.5) 68(83.0) 76(92.7) 76(92.7)
Total 82 (100) 82 (100) 82 (100) 82 (100)

Echocardiography was performed in 24 cases (29.3%) with a clinical suspicion of heart disease. It was found to be abnormal in eight cases (9.8%). The abnormalities found were total anomalous pulmonary venous connection (TAPVC) and Scimitar syndrome in four different cases; and pulmonary artery hypoplasia was present in four cases.

**TABLE 2.** CXR and CT findings in cases with persistent pneumonia

<table>
<thead>
<tr>
<th>Findings</th>
<th>Consolidation CXR (%)</th>
<th>CT (%)</th>
<th>Collapse CXR (%)</th>
<th>CT (%)</th>
<th>Broncho-pneumonia CXR (%)</th>
<th>CT (%)</th>
<th>Bronchiectasis CXR (%)</th>
<th>CT (%)</th>
<th>Pleural Effusion CXR (%)</th>
<th>CT (%)</th>
<th>Hydromone-thorax CXR (%)</th>
<th>CT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>34 (41.5)</td>
<td>8 (17.4)</td>
<td>22 (26.8)</td>
<td>13 (13.1)</td>
<td>6 (7.3)</td>
<td>0 (0)</td>
<td>2 (2.4)</td>
<td>13 (13.1)</td>
<td>4 (4.3)</td>
<td>0 (0)</td>
<td>2 (2.4)</td>
<td>4 (4.3)</td>
</tr>
<tr>
<td>Left</td>
<td>8 (9.8)</td>
<td>6 (13.1)</td>
<td>8 (9.8)</td>
<td>4 (4.3)</td>
<td>2 (2.4)</td>
<td>0 (0)</td>
<td>2 (2.4)</td>
<td>8.7</td>
<td>4 (4.3)</td>
<td>0 (0)</td>
<td>2 (2.4)</td>
<td>4 (4.3)</td>
</tr>
<tr>
<td>Bilateral</td>
<td>26 (31.7)</td>
<td>26 (56.6)</td>
<td>0 (0)</td>
<td>4 (3.7)</td>
<td>6 (7.3)</td>
<td>0 (0)</td>
<td>6 (7.3)</td>
<td>8.7</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>97.6</td>
</tr>
<tr>
<td>Absent</td>
<td>14 (17.0)</td>
<td>3 (13.1)</td>
<td>52 (63.4)</td>
<td>48 (78.3)</td>
<td>83 (80.0)</td>
<td>100</td>
<td>82 (80.0)</td>
<td>100</td>
<td>82 (80.0)</td>
<td>100</td>
<td>82 (80.0)</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>82 (100)</td>
<td>82 (100)</td>
<td>82 (100)</td>
<td>82 (100)</td>
<td>82 (100)</td>
<td>100</td>
<td>82 (100)</td>
<td>100</td>
<td>82 (100)</td>
<td>100</td>
<td>82 (100)</td>
<td>100</td>
</tr>
</tbody>
</table>

Candida skin test was done for four cases with suspected cell mediated immunodeficiency, and was negative in all the four cases. CD4+ T cell count was done for two cases with HIV infection and Pneumocystis carinii pneumonia (PCP), which showed CD4 count of 57 cells/microlitre (4%). The underlying causes of PP could be found in 80 cases (97.6%). Table 3 shows the etiological factors in descending order of frequency.

On follow up 54 cases (65.9%) showed improvement after appropriate treatment out of which sixteen (20%) had pulmonary tuberculosis; ten (12.2%) had Gram negative infections; four (4.9%) had GERD; four (4.9%) had HIV with tuberculosis; two (2.4%) had congenital heart disease; two (2.4%) had bronchial foreign body; two (2.4%) had H. influenzae type b pneumonia with empyema; and twelve (14.6%) were positive in all the four cases. CD4+ T cell count was done for four cases with HIV infection and Pneumocystis carinii pneumonia (PCP), which showed CD4 count of 57 cells/microlitre (4%). The underlying causes of PP could be found in 80 cases (97.6%). Table 3 shows the etiological factors in descending order of frequency.

In the present study most common cause for persistent pneumonia was Gram negative infection and aspiration secondary to either gastroesophageal reflux disease (GERD) or oil instillation. Tuberculosis was the next most common cause. This was followed by immunodeficiency due to HIV infection and Pneumocystis carinii pneumonia (PCP), which showed CD4 count of 57 cells/microlitre (4%). The underlying causes of PP could be found in 80 cases (97.6%). Table 3 shows the etiological factors in descending order of frequency.

**TABLE 3.** Etiologic factors in cases with persistent pneumonia

<table>
<thead>
<tr>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gram negative bacteria</td>
<td>24</td>
</tr>
<tr>
<td>Aspiration</td>
<td>24</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>16</td>
</tr>
<tr>
<td>Immunodeficiency</td>
<td>6</td>
</tr>
<tr>
<td>Cardiac disorder</td>
<td>4</td>
</tr>
<tr>
<td>Congenital malformation</td>
<td>4</td>
</tr>
<tr>
<td>Foreign body</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
</tr>
</tbody>
</table>

**DISCUSSION**

In the present study most common cause for persistent pneumonia was Gram negative infection and aspiration secondary to either gastroesophageal reflux disease (GERD) or oil instillation. Tuberculosis was the next most common cause. This was followed by immunodeficiency due to HIV infection and Pneumocystis carinii pneumonia (PCP), which showed CD4 count of 57 cells/microlitre (4%). The underlying causes of PP could be found in 80 cases (97.6%). Table 3 shows the etiological factors in descending order of frequency.

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and chronic rhinosinusitis were the main factors associated with recurrent pneumonia.[14]

CONCLUSION
In our study the most common cause for persistent pneumonia was Gram negative bacterial infection and other causes were aspiration due to gastroesophageal reflux disease or oil instillation followed by tuberculosis. Persistent pneumonia continues to be a major challenge for the clinicians. The results of our study would help pediatricians in our region to prevent and control the frequent underlying causes of persistent pneumonia in children.

REFERENCES
7. Kyprianou A, Hall CS. The challenge of nonresolving pneumonia: Knowing the norms of radiographic resolution is the key. Postgraduate medicine 2003; 113:42-90.