The Prevalence of Asthma and Pneumonia in Children Under 5 Years of Age With Acute Respiratory Symptoms Based on Reports From Attending Specialists and Standard Criteria

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Abstract

Background and Objectives: Asthma and pneumonia are the common inflammatory diseases in children with similar pulmonary symptoms such as coughing and shortness of breath. Due to the high similarity between the clinical symptoms of the diseases and the lack of appropriate paraclinical tools for the diagnosis of asthma, this study aims to consider the prevalence of asthma and pneumonia in children with acute respiratory symptoms. In this descriptive cross-sectional study, 155 children aged less than 5 years diagnosed with asthma or pneumonia in Ali Asghar hospital were studied.

Methods: A checklist was applied which contained the necessary information for the accurate diagnose of patients based on standard criteria and clinical features confirmed by a medical specialist team, including an infectious pediatrician and a pediatric asthma and allergy specialist. Eventually, the diagnosis results reported by the attending specialist’s team and the emergency physician were analyzed through SPSS software.

Findings: Of all participants, 109 (70.3%) were males and 46 (29.7%) were females. There was a significant difference in the prevalence of asthma and pneumonia reported by the emergency physician and medical specialist team (k=0.31; \(P<0.001\)). Emergency physician reported 55 patients (35.5%) with asthma, 96 patients (61.9%) with pneumonia, and 4 patients (2.6%) with asthma and pneumonia. The medical teams reported 84 patients (54.2%) with asthma, 40 patients (25.8%) with pneumonia, and 31 patients (20%) with asthma and pneumonia.

Conclusions: Due to the similarities in clinical symptoms of asthma and pneumonia, the reported incidence of asthma is less than the true level because of misdiagnosis with pneumonia.

Keywords: Asthma, Pneumonia, Pediatrics

Background and Objectives

Asthma is a chronic airway disease that increases airway resistance and responds to stimuli. Inflammatory cells such as mast cell, eosinophil, T lymphocytes and chemical mediators cause chronic inflammation. This inflammation ultimately causes hyperplasia of the muscles in the airway structure and the proliferation of extracellular matrix proteins and, as a result irreversible ducts dysgenesis.¹⁻³ In developed countries, asthma is the most common cause of chronic childhood disease. In America, 7 million children under the age of 18 suffer from asthma. Asthma is also more common in boys than in girls.¹⁻⁴ In European countries, 30 to 50 million people have been reported with asthma, which accounts for 10% of the population.⁵ Asthma in children is often associated with coughing, wheezing and shortness of breath. Patient histories should include the number of attacks of dyspnea, exercise intolerance, predisposing factors and familial history of asthma and allergies. Clinical symptoms of asthma show up to 50% to 80% of their first year of life. Viral infections, exposure to allergens and stimulants, such as cigarette smoke, are the other associated risk factors. These children usually have a history of allergic diseases such as eczema or allergic rhinitis.²⁻⁶⁻⁷ Pneumonia is defined as the lower respiratory tract infection, which includes the airway and parenchyma. One of the most important causes of the death in children under the age of 5 years is pneumonia, which accounts for

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Different viral and bacterial agents are the cause of pneumonia, of which Pneumococcus is the most important bacterium and respiratory syncytial and influenza viruses are the most important viruses. Both asthma and pneumonia show symptoms of cough and shortness of breath, with or without fever and wheezing. The accurate diagnosis of pneumonia is based on radiological, clinical, and laboratory findings. Due to the lack of single method and limitation of the use of spirometric method in children under the age of 5 years, researchers are using multiple items such as a corticosteroid test, skin allergy test, global initiative for asthma (GINA), modified asthma productive index (mAPI), and asthma-associated risk factors for the diagnosis of asthma. In these criteria, consideration of the history of repeated attacks, parental asthma, allergic rhinitis, eosinophilia more than 4%, sensitivity to food allergens, sex, history of respiratory infections and atopic dermatitis are important for the accurate diagnosis.

Due to the similarities of the clinical features of asthma with other diseases, wrong diagnosis rate is high in many children with different age groups. Thus, studies at different ages have reported fewer or higher prevalence of asthma than actual values. Pneumonia is considered as one of the most commonly diagnosed diseases that are misdiagnosed with asthma at an early age. In this study, we are seeking to provide a more accurate diagnosis of children under 5 years old with clinical features of asthma and pneumonia based on accepted international guidelines. The researcher also explains the importance of accurate diagnosis of these diseases by examining the history of previous pneumonia diagnosis and the treatment received in patients with asthma.

Methods
In this descriptive cross-sectional research, 155 children aged 6 to 59 months who admitted with acute respiratory symptoms (such as cough and shortness of breath) and diagnosis of asthma and pneumonia from March 2016 to March 2017 at Ali Asghar hospital (Tehran province, Iran), were entered into the study. In this study, the census-based longitudinal method was applied for sampling. All necessary information needed for the accurate diagnosis of asthma and pneumonia was collected in a checklist using international guidelines and consulting with a medical team containing an infectious specialist and a specialist in asthma and allergy. Documents of clinical findings and family history were also available. After completing the required information, the checklist of each patient was evaluated by asthma and allergy specialist and an infectious disease specialist.

Check list

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<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>Clinical Manifestation:</td>
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<td></td>
</tr>
<tr>
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<td>dyspnea:</td>
<td>temperature:</td>
</tr>
<tr>
<td>O₂ saturation:</td>
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<td></td>
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<tr>
<td>CXR findings:</td>
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<td></td>
</tr>
<tr>
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<td>Hazinec</td>
<td>No Graphy</td>
</tr>
<tr>
<td>Lab Data:</td>
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<td></td>
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<tr>
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<td>Poly:</td>
<td>CRP:</td>
</tr>
<tr>
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</tr>
<tr>
<td>Previous Attack:</td>
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<tr>
<td>Previous pneumonia:</td>
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<td>Food or another</td>
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<tr>
<td>Allergy:</td>
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</tr>
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</table>

Figure 1. The Applied Checklist.
The prevalence of asthma and pneumonia in children under 5 years of age with acute respiratory symptoms

variables and frequency (percentage) for categorical variables. To investigate the relationship between diagnosis performed by physicians and the diagnosis of the medical team from the present study, the Cohen’s kappa test was used. The correlation coefficient was calculated at the end. P values <0.05 were considered to be statistically significant.

Results
Of the 155 children studied, 109 (70.3%) were males and 46 (29.7%) were females. The hospital emergency physician diagnosed 55 (35.5%) children with asthma diagnosis, 96 (61.9%) with pneumonia and 4 (2.6%) with asthma and pneumonia (Table 1). The medical teams reported 84 (54.2%) children with asthma diagnosis, 40 (25.8%) children with pneumonia and 31 (20%) patients with asthma and pneumonia (Table 1). Based on the analysis performed by the Cohen Kappa statistical test, the correlation coefficient of the diagnosis of the two groups of physicians was 0.31 and showed a significant difference between the diagnosis of the two groups (P<0.001).

Discussion
Asthma and pneumonia are respiratory diseases with similar symptoms, but the chronic nature of asthma and the acute nature of pneumonia have increased the importance of accurate diagnosis of these diseases. Since the accurate diagnosis of these diseases is important for children’s health, health economics, as well as detailed diagnostic guidelines for physicians who visit the patient for the first time, various studies have been conducted on the confounding factors for the accurate diagnosis of asthma. It seems that emergency physician may make a mistake between Asthma and pneumonia in diagnosis. In a study by Speight, on 34 patients aged 2 to 12 years with a definite diagnosis of asthma, a previous diagnosis of asthma was prescribed for only two patients, and others as a recurrent lung infection and bronchitis have been known. In our study, it was also shown that a number of asthmatic patients were admitted as pneumonia. In another descriptive study by Hazir et al, in Pakistan, of 1622 children under the age of 5 who complained of cough, shortness of breath and wheezing, 1004 children were diagnosed with mild pneumonia and the rest had severe pneumonia. Administration of three courses of corticosteroids and 3 to 5 days following-up showed that two-thirds of patients diagnosed with pneumonia probably did not require antibiotic therapy. In our study, 63 out of the 115 patients (54.8%) who were diagnosed with asthma by the medical team, were treated with antibiotics before admission time. Therefore, it can be concluded that patients with asthma are not only do not receive adequate oral intake of corticosteroids, but also they receive inappropriate antibiotic therapies. Another study in Uganda, which was conducted on children aged 6 to 59 months with respiratory complaints, reported that 41.2% of patients had asthma syndrome, 53.7 had pneumonia, and the rest had other problems such as aspiration. It is also noticed that only 9.5% of children with asthma were diagnosed in the past. Furthermore, 95.3% of these children received inappropriate antibiotic treatment before admission time. The results of this study are similar to our findings and emphasize the importance of teaching medical students how to accurately diagnose asthma and its proper treatment. Patients with more than one history of pneumonia admission should be considered for the possibility of asthma. Various studies suggest the frequent occurrence of pneumonia that expresses the potential for asthma. Our study showed that out of 115 patients with asthma, 53 (46.1%) had a history of at least one previous admission with pneumonia. Therefore, since the differentiation of asthma and pneumonia in children under

Figure 2. Modified Asthma Productive Index.
5 years old is not easy, the possibility of misdiagnosis in these diseases is relatively high. The misdiagnosis of the illness, in addition to the patient's inappropriate treatment, increases the risk of future complications of asthma and impose additional costs on the health of nations.

Conclusions

Our study revealed that the diagnosis of asthma is less than the actual report. Misdiagnosis of asthma and pneumonia has led to the inappropriate treatment of asthma with unnecessary antibiotics. Attention to the asthma associated risk factors and also past medical history can help to accurate diagnosis of the disease and prevent long-term complications.

Abbreviations

GINA: Global initiative for asthma; mAPI: modified asthma productive index; WHO: World health organization.

Competing Interests

None declared.

Authors’ Contributions

AB contributed to patients selection, data analysis, and manuscript writing. BS contributed to manuscript writing and review, questionnaire analysis. SG participated in manuscript writing and data analysis. MA participated in study design, manuscript review and submission process.

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References


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