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Cross Sectional Study on Antibiotic Prescription for Acute Respiratory Tract Infection of Children under Age of 5 at Tertiary General Hospital in Jakarta Indonesia

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Authors' contributions

This work was carried out in collaboration between all authors. Author MR designed the study analysis of the results and writing the manuscript. Author SF supervised the entire work. Author OTW contributed to carry the experiments. All authors read and approved the final manuscript.

Original Research Article

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ABSTRACT

Aim: The purpose of this study was to evaluate the use of antibiotics in acute respiratory infections in children in Dr Mintohardjo Navy Hospital, Jakarta.
Place and Duration of Study: Pediatric Clinic of Dr. Mintohardjo Navy Hospital, Jakarta, Indonesia during January to December 2012.
Methodology: This study is a cross-sectional study consisting of children under the age of 5 years, who suffered from acute respiratory tract infections and hospitalized at pediatric clinic of Dr. Mintohardjo Navy Hospital, Jakarta. The data were collected from patient medical records retrospectively. The assessment of antibiotic prescribing patterns for children younger than 5 years was carried out based on the Indonesian Guideline of antibiotic use in acute respiratory tract infections in children.
Results: A total of 96 patients enrolled in this study consisted of 53.1% males and 46.9% females. The types of acute respiratory tract infections were acute pharyngotonsilitis (95.8%), acute pneumonia (3.1%) and acute laryngitis (1.1%). The most commonly used antibiotics were ceftriaxone (42.5%), cefotaxime (30.0%), gentamicin (6.3%), cefadroxil

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(5.0%), cefixime (5.0%), sulfamethoxazole-trimethoprim (5.0%), amoxicillin (2.5%), thiamphenicol (2.5%) and chloramphenicol (1.3%).
Conclusion: The compliance rate of pediatricians to follow the Indonesian Guideline on the use of antibiotics for acute respiratory tract infections was very low. It is necessary to increase compliance with the Indonesian Guideline to improve the control program of acute respiratory infections, and to prevent the emergence of antibiotic resistance.

Keywords: Antibiotics; acute respiratory infection; pediatric.

1. INTRODUCTION

Acute respiratory tract infection of children is still one of the main public health problems in the world, including in Indonesia. This disease is a major cause of morbidity and mortality especially in children under the age of 5 years. The World Health Organization (WHO) estimated that respiratory tract infections are the second leading cause of death for children under five years old in 2010 [1], and WHO stated that pneumonia is one of the three main causes of neonatal mortality [2]. The incidence of pneumonia is increasing every year. Approximately 150 million new episodes of pneumonia were identified each year worldwide, and more than 90% occurred in developing countries. More than 30% of total annual deaths occur in children younger than 5 years. *Streptococcus pneumonia* and *Haemophilus influenzae* type b (Hib) is a major cause of bacterial pneumonia in the world [3,4]. WHO also reported that in developing countries such as Nigeria, Gambia, Senegal, Chad, Cameroon, Burkina Faso, and Mali the incidence of acute respiratory tract infection was about 15-21 % of children aged less than five years [5].

Acute respiratory infection is defined as an infectious disease in the upper and lower respiratory tract. Upper respiratory tract infections include colds, laryngitis, pharyngitis /tonsillitis, rhinitis, acute rhinosinusitis and acute otitis media. Lower respiratory tract infections include acute bronchitis, bronchiolitis, pneumonia and severe pneumonia [6]. Populations at high risk of acute respiratory tract infections are children under five years, the elderly, and patients with decreased immune systems. The incidence of upper respiratory tract infections are very high but rarely life threatening, whereas lower respiratory infections are responsible for more severe illnesses such as pneumonia, tuberculosis, and bronchiolitis which are major contributors to mortality of acute respiratory tract infection [7].

In Indonesia, as in other developing countries, the incidence of acute respiratory infection of infant and young children is still very high. According to the data from the Directorate General of Disease Control and Environmental Health, Ministry of Health, Republic of Indonesia, in 2012 pneumonia is responsible for 13.2% of the deaths [8].

The high incidence of acute respiratory infections in children often encourages pediatricians to prescribe antibiotics. Antibiotics are often prescribed for acute respiratory tract infections in particular for upper respiratory tract infection, despite the fact that most of these infections are caused by viruses [9]. The overuse of antibiotics in medical care contributed to the problem of bacterial drug resistance worldwide [10,11].

In Indonesia, there have been rare studies of the rational use of antibiotics for acute respiratory tract infections. Therefore, the purpose of this study was to evaluate the antibiotic prescribing for acute respiratory infections in children younger than 5 years old in the pediatric clinic of Dr. Mintohardjo Navy Hospital, Jakarta, Indonesia.

2. SUBJECT AND METHOD

2.1 Study Location

This study was carried out at the pediatric clinic of a tertiary care Navy Hospital of Dr Mintohardjo, Jakarta, Indonesia. This tertiary referral hospital receives about 850 pediatric patients annually.

2.2 Study Design

A retrospective cross-sectional study was carried out on pediatric patients with acute respiratory tract infections. Demographic and clinical data were collected retrospectively from patient medical records who had been admitted to pediatric clinic during January to December 2012. Inclusion criteria: Hospitalized patients under five years of age suffering from acute respiratory infections. Exclusion criteria: Other infectious diseases, abnormal liver or kidney function, chronic diseases and patients with incomplete medical records. The assessment of antibiotics prescribing for children younger than 5 years was carried out based on the Indonesian Guideline of antibiotics usage for acute respiratory tract infections provided by the Ministry of Health, Republic of Indonesia [12]. Data was entered into SPSS package (version 20.0). Chi square test was applied for statistical significance.

3. RESULT

During January to December 2012, a total of 834 pediatric patients were admitted in the pediatric clinic of Dr. Mintohardjo Navy Hospital. Out of 834 patients 96 patients were enrolled and met the inclusion criteria. The distribution of acute respiratory infection in children according to age and gender is shown in Table 1, while the distribution of cases according to illness is shown in Table 2. All patients received antibiotics. The most commonly used antibiotics were ceftriaxone (42.5%), cefotaxime (30.0%), gentamicin (6.3%), cefadroxil (5.0%), cefixime (5,0%), sulfamethoxazole-trimethoprim (5.0%), amoxicillin (2.5%), thiamphenicol (2.5%) and chloramphenicol (1.3%). In term of the selection of antibiotics, the adherence to the Indonesian Guideline was only 2.5%.

Table 1. The distribution of cases according to age and gender

Age group	Male No.(%)	Female No.(%)	Total No.(%)	Test of significance (Chi-square)
0-1	18 (35.3)	16 (35.6)	34 (35.4)	
2-3	15 (29.4)	11 (24.4)	26 (27.1)	
3-4	11 (21.6)	10 (22.2)	21 (21.9)	
4-5	7 (13.7)	8 (17.8)	15 (15.6)	
Total	51 (53.1)	45 (46.9)	96 (100.0)	p = 0.617

Table 2. The distribution of cases according to illness

Illness	No.	Percentage (%)
Acute pharyngotonsilitis	92	95.8
Acute Pneumonia	3	3.1
Acute laringitis	1	1.1
Total	96	100.0

4. DISCUSSION

Acute respiratory infection is a common disease in children. Most cases were due to upper respiratory tract infection. In our study we found that occurrence of acute respiratory tract infection in male children was slightly higher than in female children. However, there was no significant statistical difference between gender ($p>0.05$). This result was similar to the findings of other studies conducted in Iraq [13] and in Egypt [14], but in contrast to other studies that showed a higher prevalence of infectious diseases in male children when compared to female children [15-16]. In terms of age, we found that the incidence of acute respiratory tract infections decreased with increasing patient age as shown in Table 1.

Antibiotic therapy in acute respiratory tract infections is often based on clinical manifestations, while the identification of microorganisms that cause infections remains difficult to prove despite the use of different diagnostic [17,18].

Antibiotic prescribing for acute respiratory tract infections varies in each country; this may be due to several factors such as prescribing patterns, parental expectations, the structure of the health system and the policy in the use of antibiotics in each country [19,20].

Antibiotic administrations in children suffering from acute respiratory infections can be recommended only if symptoms persist for 10-14 days without improvement [21], and to prevent post-streptococcal syndromes, such as glomerulonephritis and acute rheumatic fever. Drug preferred for treatment of acute pharyngotonsilitis caused by group a beta-hemolytic *Streptococcus* is penicillin V for 10 days or a single dose of parenteral benzathine penicillin G. However, administration of amoxicillin as an alternative can be done to improve patient compliance. Another type of antibiotic that can be given is a first or second-generation cephalosporins, clindamycin, or macrolides. In Indonesia, the clinical practical guideline on the use of antibiotics against acute respiratory tract infections in children has been adopted from some standardized guidelines [22-26], as shown in Table 3.

In the present study we found that the rate of compliance of pediatricians to follow the Indonesian Guideline of administration antibiotics for acute respiratory infections was very low. Most of patients received the third generation of cephalosporin. Third generation cephalosporin was probably used because ceftriaxone and cefotaxime were affordable antibiotics for the patients. In our hospital the selection of antibiotics for acute respiratory tract infections was still the empirical therapy. The antibiotic treatment was only based on the clinical manifestations of the acute respiratory infection. Giving antibiotics for acute respiratory infection without performing diagnostic test or throat culture to confirm bacterial etiology is a matter of our concern. Therefore it is important to improve the appropriateness when selecting antibiotics for treatment of acute respiratory tract infection in our hospital.

Usually, most patients with a sore throat have a virus infection. About 15-30% of pharynhotonsillitis cases in children are caused by group a beta-hemolytic Streptococcus [27].Therefore, for the treatment of pharyngotonsilitis, bacterial identification must first be done to ensure that pharyngitis is caused by the bacteria. The decision to treat acute respiratory infection with antibiotics should not solely be based on clinical manifestations, but also on the proper identification of the etiological pathogen, and specifically on the pattern of bacterial sensitivity to antibiotics. Antibiotics should not be given to children with pharyngitis in the absence of diagnosed group A Streptococcal infection. The collaboration of health care professionals is very important to improve the appropriate use of antibiotics. In collaboration with pediatricians and other health care professionals, clinical pharmacists

should be responsible for optimizing the appropriate use of antibiotics. The inappropriateness of selecting antibiotics can increase the treatment costs and the emergence of antibiotic resistance.

Table 3. The Indonesian Guidelines for the use of antibiotics in acute respiratory tract infections for children under 5 years old [12]

Antibiotic	Dosage
Acute upper respiratory infection	
First Line	
Penicillin G	1.2 MU (Intramuscular; single dose)
Penicillin VK	250mg (2-3 times) a day for 10 days
Amoxicillin	250mg (3 times) a day for 10 days
Second Line	
For beta-lactam allergy:	
Erythromycin	250mg (4 times) a day for 10 days
Azitromisin	10mg/kg once daily for 5 days
Clarithromycin	15mg/kg twice daily for 5 days
First or second generation of cephalosporin	20-30mg/kg twice daily for 10 days
Failed in initial therapy	
Clindamycin	20-30mg/kg/day in three divided doses for 10 days
Amoxicillin-clavulanate	40mg/kg/day in three divided doses for 10 days
Benzathine penicillin G with rifampicin	1.2 MU (Intramuscular; single dose) Rifampicin: 20mg/kg/ in two divided doses for 4 days
Community-acquired pneumonia	
Erythromycin	30-50mg/kg/day in four divided doses for 5 days
Azitromisin	10mg/kg once daily for 5 days
Clarithromycin	15mg/kg twice daily for 10 days
Ampicillin or amoxicillin	100mg/kg/day divided every 8 hours for 7-10 days

5. CONCLUSION

It can be concluded that the compliance rate of pediatricians to follow the Indonesian Guideline of antibiotics use for acute respiratory tract infections was very low. The prescription of antibiotics for acute respiratory tract infections was still the empirical therapy. Therefore we strongly recommend the implementation of and adherence to the Indonesian Guideline. The selection of antibiotic therapy should be based on the local bacterial sensitivity pattern to improve the control program of acute respiratory infections, and to prevent the emergence of antibiotic resistance.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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