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Research Article

**RETROSPECTIVE STUDY ON THE PRESCRIBING PATTERN
OF ANTIBIOTICS FOR LOWER RESPIRATORY TRACT
INFECTIONS AMONG PEDIATRICS IN AMPANG HOSPITAL****Jagdave Singh Sidhu^{1,2}, Prabhu Muthaiyan^{3*}, Radha Prabhu⁴ And Joysa Ruby Joseph⁵**¹Faculty of Pharmacy, Asia Metropolitan University, 43200, Cheras, Selangor Darul Ehsan, Malaysia.² Faculty of Science, Technology, and Engineering, LaTrobe University, Bendigo, Australia.³Department of Pharmacy Practice, Acharya & BM Reddy College of Pharmacy, Acharya Dr.Sarvepalli Radhakrishnan Road, Soldevanahalli, Hesarghatta Road, Achit Nagar Post, Bangalore-560 107, India.⁴Department of Pharmaceutical Chemistry, Acharya & BM Reddy College of Pharmacy, Acharya Dr.Sarvepalli Radhakrishnan Road, Soldevanahalli, Hesarghatta Road, Achit Nagar Post, Bangalore-560 107, India.⁵Department of Pharmaceutics, Acharya & BM Reddy College of Pharmacy, Acharya Dr.Sarvepalli Radhakrishnan Road, Soldevanahalli, Hesarghatta Road, Achit Nagar Post, Bangalore-560 107, India.**Abstract:**

Antibiotics are commonly prescribed for the lower respiratory tract infection. Irrational use of antibiotics will increase chances of resistance of bacteria as well as increase in the side effects and total cost of treatment. This study was conducted to determine the prescribing pattern of antibiotics used in lower respiratory tract infections. A retrospective study was conducted to determine the prescribing pattern of antibiotics used in lower respiratory tract infections. 150 patients were involved in this study. The obtained data was examined and were subjected to descriptive statistical analysis using Statistical Package for Social Sciences version 20. 150 patient's medical records were observed. Female accounted for 50.7% (76) and male for 49.3% (74) of the total case ($p>0.05$). Majority of them were 62.7% Malays, 20.7% Chinese and 16.7% Indians. Most frequently used antibiotic are macrolides (53.3%), aminoglycosides (29.3%), penicillins (24%), carbapenems (16.7%) and cephalosporins (10.7%). Most of the culture and sensitivity test showed mycoplasma pneumonia (44.67%) is commonly encounter microorganism. 59.3% of them received monotherapy and 40.7% of the patients received combination therapy. Ampang hospital was adhering to the Clinical Practice Guideline while prescribing antibiotics for the treatment of lower respiratory tract infections. The commonly given antibiotic class was macrolides. Monotherapy more preferred than combination therapy but both were reserved for the treatment of severe pneumonia.

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INTRODUCTION:

About 10% of the worldwide saddle of morbidity and mortality are linked to respiratory tract infections (RTIs) [1]. These infections may vary from acute infections, such as pneumonia and bronchitis, to chronic conditions such as asthma and chronic obstructive pulmonary disease [2]. Severity of lower respiratory tract infections (LRI) is more when compared to upper respiratory infections. LRIs are the chief root of death among all the infectious diseases. Lower respiratory tract infections (LRI) are the current problem in society and its occurrences are associated with momentous morbidity and mortality. LRI inflict an extensive cost to the nation [3]. 5 million deaths were accounted annually among children less than 5 years old in developing country due to pneumonia. A total of 12.9 million losses globally in 1990 in children, over 3.6 million deaths were mostly due to pneumonia [4].

Viruses are the main reason of respiratory tract infection to occur [5]. Consequently, imbalances in the ecosystem may result in overgrowth and incursion by bacterial pathogens, causing respiratory or invasive diseases [6]. Across the world pediatrics are usually higher than average risk of developing infectious disease [7].

These respiratory tract infections are the basis of consulting the general practitioners [8,9]. In United States, it is found to be over 37 millions visit a single year. Whereas, in Malaysia approximately 30% of visit to private and government healthcare clinic [10,11]. Acute respiratory tract infections are still one of the most widespread reasons for sickness certification for patients to seek medical advice and for antibiotics to be prescribed [12]. Antibiotics therapy is beneficial for children only if symptoms persist for more than 10-14 days without improvement [13].

In Malaysia prescribing pattern is still a nightmare because antibiotics are still widely given to the patients' despite the infections of lower respiratory tract. We are currently lacking of data to compare and review; and due to this, the best option is to create awareness in treating non-bacterial illness or those that are self-limiting with antibiotics by referring

clinical practice guideline in order to reduce the risk of resistant in Malaysia. On the other hand, it is also to prevent inappropriateness which exposes patients to unnecessary potential side effects associated with antibiotics and increases medical costs. This study is also done to prevent polypharmacy in prescribing antibiotics for the treatment of RTIs.

MATERIALS & METHODS

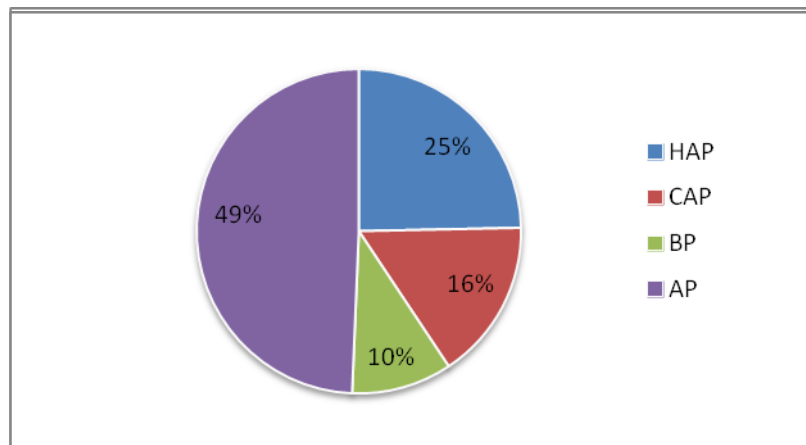
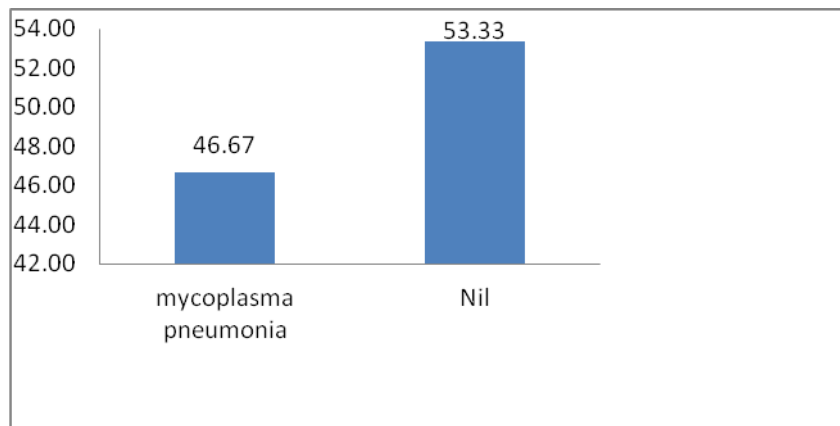
A retrospective study was carried out on paediatric patients who were admitted in the hospital due to lower respiratory tract infections. 150 paediatric patients demographic and clinical data were collected retrospectively to be used for this study from December 2014 to April 2015. Guidelines for antibiotic use from the National Antibiotics Guideline and Pediatrics Protocol were used to evaluate the appropriateness of indications for antibiotic prescription [14,15]. Descriptive statistical method was used to analyse data using *Statistical Package for Social Sciences* (SPSS) software version 20. The Chi square test was also used accordingly. Inclusion criteria: Hospitalized paediatric patients who are suffering from pneumonia, patients who are receiving oral and liquid antibiotics and data are limited within 5 years. Meanwhile the exclusion criteria were patients with incomplete medical records and patients having more than one infection.

RESULTS:

Throughout December 2014 to April 2015 a total of 150 patients were admitted in paediatric wards in Ampang Hospital. The distribution of lower respiratory tract infection in pediatrics according to gender, age and ethnicity is shown in **Table 1**. While distribution of cases according to diagnoses is shown in **table Figure 1**. All the patients were prescribed with antibiotics. They are macrolides (53.3%), aminoglycosides (29.3%), penicillins (24%), carbapenems (16.7%) and cephalosporins (10.7%). 56% of Culture and sensitivity test was done from the 150 patients. 46.67% of culture test results showed mycoplasma pneumonia as the microorganism and 53.33% culture test was not done. From 150 patients with antibiotic prescriptions, 89 (59.3%) of them received monotherapy and 61 (40.7%) of the patients received combination therapy.

Table 1: Prevalence of patients diagnosed with lower respiratory tract infections

| Characteristic | LRTI |
|---------------------|------------|
| Gender | |
| Male | 74 (48.3%) |
| Female | 76(50.7%) |
| Ethnic group | |
| Malay | 94 (62.7%) |
| Indian | 25 (16.7%) |
| Chinese | 31 (20.7%) |
| Age | |
| 0-2 years | 90 (60%) |
| 3-5 years | 50 (33.3%) |
| 6-8 years | 4 (2.7%) |
| 9-12 years | 6 (4%) |

Figure 1: Diagnosis of lower respiratory tract infection.**Figure 2: Commonly prescribed antimicrobial agents****Figure 3: Types of microorganism isolated**

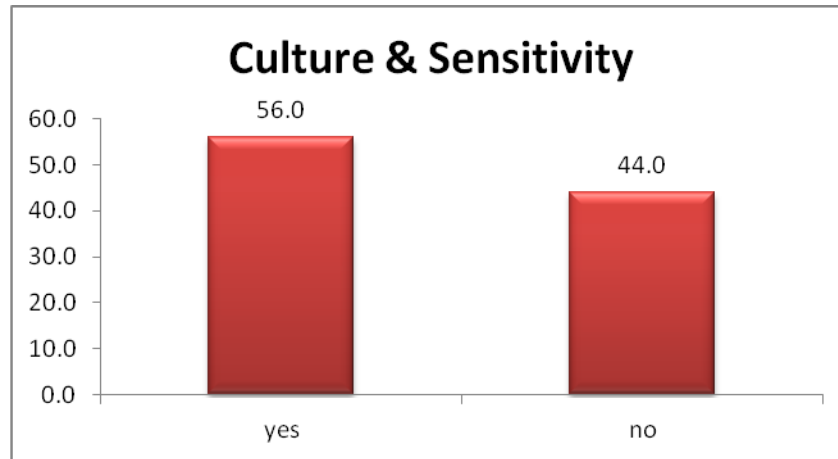


Figure 4: Culture and Sensitivity

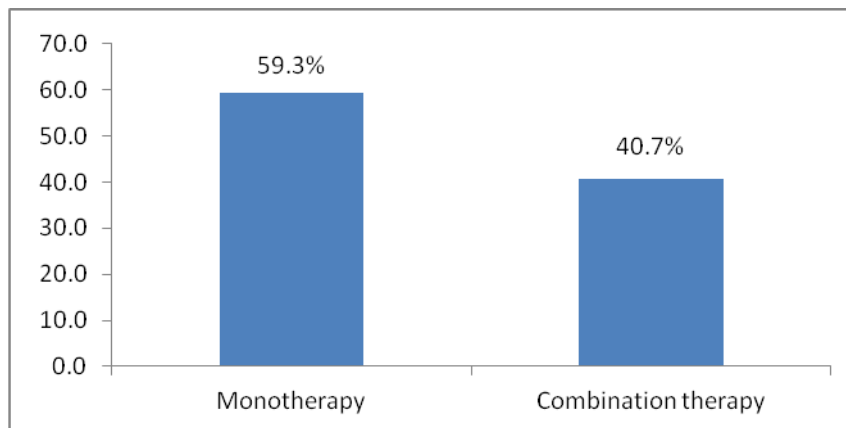


Figure 5: Numbers of antibiotics prescribed

DISCUSSION:

Generally, therapeutic method used for lower respiratory tract infection is mainly empirical and the physician's aim is to treat as specifically as its severity is more dangerous.

The demographic characteristics displayed slightly higher percentages of female patients were suffering from infection than male patients. Nevertheless there was no significant statistical difference between gender ($p > 0.05$). (Table 1) This study was similar to another study done in India where more female patients were suffering from infection than male patients [3]. Meanwhile, other studies displayed higher occurrence of infectious diseases in male children when compared to female children [16]. Children with younger age (0-2 years) are more vulnerable to risk of getting infection because of their immunity level [17]. We found that the incidence of lower respiratory tract infection decreased with as the patient's age increased. Ethnicity shows that Malays

are the highest proportion of patients admitted for lower respiratory tract infection.

During the study period, only pneumonia cases were encountered compared to other lower respiratory tract infections. Pneumonia can be classified into atypical pneumonia, community acquired pneumonia, hospital acquired pneumonia and bronchopneumonia. Atypical pneumonia was shown the highest percentage of infection in that period of time. In a recent study showed that 75% of children were hospitalized due to atypical pneumonia [18].

This study shown countless variety of antimicrobial agents used for the treatment of the patients admitted for lower respiratory tract infections in Ampang Hospital. Based on figure 2, most frequently used antibiotics for the treatment were macrolides followed by aminoglycosides, penicillins, carbapenems and cephalosporins. Based on Paediatric protocol and National Antibiotic Guideline, selection of antibiotics was done based empirical therapy

[14,15]. The empirical selection of antibiotics for LRTI is shown in **figure 5**. Most of the cases encountered in Ampang Hospital showed that (46.67%) mycoplasma pneumonia is the microorganism that caused the infection (**Figure 3**). Based on the Paediatric Protocol as given in table 2 and National Antibiotics guidelines, if the microorganism is mycoplasma pneumonia, the best choice of antibiotic class to be used for the treatment of lower respiratory tract infection is macrolide which is Erythromycin (20mg/kg BD) and Azithromycin (10-15 mg/kg/day daily dose). Study

done by PWK Chan et al., also stated that macrolide are the best choice of drug for mycoplasma pneumonia [19] (**Table 3**). Besides that, aminoglycosides and beta lactams were also given in combination for the treatment of pneumonia. Study done by Arun Bansal et al., have shown that combination of aminoglycosides and beta lactams is effective for the treatment of severe or very severe pneumonia [20]. This showed that the Hospital is adhering to Clinical Practice Guidelines for the treatment of lower respiratory tract infection.

Table 2: Pediatric Protocol for Malaysian Hospital.

| Suggested antimicrobial agents for inpatient treatment of pneumonia | |
|---|--|
| First line | Beta-lactams: Benzyl Penicillin, Amoxycillin, Ampicillin, Amoxycillin-Clavulanate |
| Second line | Cephalosporins: Cefotaxime, Cefuroxime, Ceftazidime |
| Third line | Carbapenem: Imipenam |
| Other agents | Aminoglycosides: Gentamicin, Amikacin |

Table 3: Bacterial pathogens and recommended antimicrobial agents

| Pathogen | Antimicrobial agent |
|---|---|
| Beta-lactam susceptible | |
| Streptococcus pneumonia | Penicilin, Cephalosporins |
| Haemophilus influenza type b | Ampicillin, Chloramphenicol, Cephalosporins |
| Staphylococcus aureus | Cloxacillin |
| Group A Streptococcus | Penicillin, Cephalosporin |
| Mycoplasma pneumonia, Chlamydia pneumonia, Bordetella pertussis | Macrolides, e.g. Erythromycin, Azithromycin |

Figure 4 showed that culture and sensitivity test was done in 56% cases of lower respiratory tract infection respectively. The decrease in percentage culture might be due to clinical presentation during admission or consumption the antibiotic preceding to admission. Sterility of culture might be a reason and also to the virility of illness and, or improper collection specimen was done.

When the prescriptions were screened thoroughly, it showed that 59.3% of prescriptions were mono therapy and 40.7% where prescriptions containing combination therapy. This presentation shows that mono therapy were more preferred than combination therapy. In this case, combination therapy is still given for prophylaxis and therapeutic purposes. For example; combination of some antibiotics were given to cover for both gram positive and gram negative bacteria meanwhile culture and sensitivity test are done. Once the microorganism is discovered, the previous antibiotics are tapered down and changed to specific classes that may act specifically towards that microorganism. Furthermore, combination therapy of

Beta- lactams and macrolide were used in Ampang Hospital for the treatment of severe pneumonia cases. Recent studies are done that combination of Beta-lactams and macrolide have provided better treatment therapy for severe pneumonia cases. (Rodrigo, McKeever, Woodhead, & Lim, 2013)

Utmost drugs were prescribed by generic name which on the other hand helps the hospital pharmacy to have improved inventory control. These will also aid in reduction of confusion among the pharmacists while dispensing because lesser brands to refer. Generic drugs are more fiscal than the branded ones. Prescribing by brand name may be one of promotional strategies by pharmaceutical companies to market their products.

CONCLUSION:

Pneumonia is the cause of 3.6 million deaths worldwide. This study indicated that Ampang hospital was adhering to the Clinical Practice Guideline while prescribing antibiotics for the treatment of lower respiratory tract infections. The

commonly given antibiotic class for the treatment of lower respiratory tract infections was macrolides. Monotherapy was more preferred in this hospital because culture and sensitivity test had confirmed that the microorganism is mycoplasma pneumonia. Combination therapy was also preferred but to a lesser extent for the treatment of severe pneumonia.

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