EVALUATION OF ANTIBIOTICS USED IN PATIENTS WITH ACUTE RESPIRATORY INFECTIONS IN A HOSPITAL

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INTRODUCTION

Acute respiratory infection (ARI) disease or often referred to as ARIs is infections caused by viruses or bacteria. This infection begins with heat accompanied by one or more symptoms: Throat pain or pain, runny nose, dry cough, or phlegm. ARI is always ranked first of the 10 most diseases in Indonesia [1].

In Medan, the incidence of ARI was 225,494 cases (47.62%), and in Deli Serdang District, the cases of ARI were 12,871 cases (31.7%) of the total population. Deli Serdang Regency and Medan are regions that have high rates of morbidity of ARI in infants [2]. As many as, 40%-60% of ARI cases were outpatients, while only 15%-30% of them were female. However, based on the results of statistical analysis, evident that most (59%) of the patients were male, while only 42% of them were female. However, based on the results of statistical analysis, there were no significant differences between the number of male and female patients (p=0.586).

METHODS

This research is a prospective cross-section descriptive study design. The required data were obtained from medical records and prescription of ARI patients at the outpatients installation of the Bunda Thamrin General Hospital, Medan, for March 2018–May 2018 which was approved by Health Research Ethical Committee (University of Sumatera Utara; No.474/TGL/KEPK FK USU-RSUP HAM/2018). This study was conducted to determine the amount of antibiotic use in ARI therapy and to examine the use of antibiotics in patients using the Anatomical Therapeutical Chemical (ATC)/DDD methods.

RESULTS

Of 139 patients, only 130 patients met the inclusion criteria. Characteristics of these patients included gender and age of patients are presented in Table 1. Based on the gender of patients diagnosed with ARI during March–May 2018 period, of 130 patients, it was evident that most (59%) of the patients were male, while only 42% of them were female. However, based on the results of statistical analysis, there were no significant differences between the number of male and female patients (p=0.586).
Based on the characteristics of the gender group of 130 ARI patients from March to May 2018, there were 76 males (58.461%) and 54 females (41.538%). Based on the results of statistical analysis, there were no significant differences between the number of male and female patients with p=0.586 (p<0.05). A research conducted by Ahyanti about relationship between smoking and the incidence of ARI in students in Tanjung reef (2013), showed that various risk factors that increase the incidence of ARI are with male gender. Proven with the results of the study, from the students suffering from ARI, 58.0% of them were manifolds male gender, p=0.041, meaning there is a meaningful relationship between genders with ARI [7].

The pattern of antibiotic use in outpatients with ARI based on diagnosis is shown in Figs. 1 and 2.

Of the six age groups of the patients, it was found that the age group of 26–35 years had the highest prevalence with amount of 53 patients (40.76%), followed by 17–25 years was 27 patients (20.76%), and the age group of 46–55 years had a percentage of 13 patients (10%), compared to the age group of 12–16 years had a percentage of 8 patients (6.15%) while the lowest number of patients was in the 56–65 years age group of 3 patients (2.30%). The results of statistical tests for age groups showed no significant differences with p=0.098 (p<0.05), different from the research conducted by Marniati, in 2017, on the analysis of causal factors on the incidence of ARI, namely the frequency of the age of respondents with ARI in the region of West Aceh health centers with the highest number: Age 36–40 years 38 people (37.8%) [11]. According to the WHO in 2014 sStates that the causes of acute respiratory tract infections vary widely, the onset of symptoms can take place starting from hours to days after the onset of infection. The symptoms of this disease consist of fever, coughing, and frequent sore throat, runny nose, shortness of breath, wheezing, or difficulty breathing. Pathogens that cause acute respiratory tract infections are influenza virus, parainfluenza virus, rhinovirus, respiratory syncytial virus, and severe respiratory syndrome coronavirus [12].

Based on the data obtained then the calculation of the quantity of antibiotic is used by following the rules established by the WHO Collaborating Center 2011. Antibiotics are grouped according to the ATC code and class; then, the dosage form is adjusted to the definitive DDD units of each antibiotic use by patients. The definitive DDD unit uses milligram, so the unit of antibiotic dose must be converted into milligrams first [10].

**DISCUSSION**

The highest prevalence of patients in the age group of ARI patients is the age range of 26–35 years with a percentage of 53 patients (40.76%). The results of statistical tests for age groups showed no significant differences with p=0.098 (p<0.05), different from the research conducted by Marniati, in 2017, on the analysis of causal factors on the incidence of ARI, namely the frequency of the age of respondents with ARI in the region of West Aceh health centers with the highest number: Age 36–40 years 38 people (37.8%) [11]. According to the WHO in 2014 sStates that the causes of acute respiratory tract infections vary widely, the onset of symptoms can take place starting from hours to days after the onset of infection. The symptoms of this disease consist of fever, coughing, and frequent sore throat, runny nose, shortness of breath, wheezing, or difficulty breathing. Pathogens that cause acute respiratory tract infections are influenza virus, parainfluenza virus, rhinovirus, respiratory syncytial virus, and severe respiratory syndrome coronavirus [12].

Based on the data of ARI patients, it was found that the highest number of patients based on gender were male patients with the number 76 patients (58.4%) obtained by dividing the number of male patients with the total number of patients then multiplied by 100%, this is the same as research in Mei Ahyanti’s about smoking relationship with the incidence of ARI in students in Tanjung reef (2013). Proven with the results of the study, from the students suffering from ARI, 58.0% of them were manifolds male gender, p=0.041, meaning there is a meaningful relationship between genders with ARI [7].

From the classification of the WHO Collaborating Center, the data obtained were 130 cases, March–May 2018 use by ARI patients, treatment profiles of ARI patients in outpatients installations distributed into three classes of drugs and six types of antibiotics. The highest use of antibiotics in patients with ARI is azithromycin antibiotic. This is based on the activity of azithromycin which has more potent antibacterial activity to gram negative, wider distribution volume and longer half-life so that it is preferred for respiratory tract infections (Table 2) [13].

Based on the data obtained, the calculation of the quantity of antibiotic is used by following the rules established by the WHO Collaborating Center 2011. Antibiotics are grouped according to the ATC code and class; then, the dosage form is adjusted to the definitive DDD units of each antibiotic use by patients. The definitive DDD unit uses milligram, so the unit of antibiotic dose must be converted into milligrams first [10].
inpatients hospital in July–September 2013” obtained data from 16 ARI patients who used antibiotic therapy, there were six types of antibiotics used, namely cefixime, amoxicillin, ceftriaxone, cefotaxime, erythromycin, and paromomycin sulfate. The highest use of antibiotics was cefixime that reached as much as 36.84% [14]. The antibiotics prescribed in ARI patients need more attention by health professionals [15,16].

CONCLUSIONS

Most patients with ARI were male with the age range of 26 years–60 years. The mean value of patients age was 32.12±10.58 years. Azithromycin was the most widely available antibiotic for the treatment of ARI patients, with the ATC code, J01FA10 indicating the location organ where the drug of work and the type of antibiotic. Azithromycin has a usage quantity of 1,897.435 DDD/1000 KPRJ-day. This study is limited by the small sample size and the patients’ admission period from which the data were extracted. In the future, large-scale research is needed to get more accurate results.

AUTHORS’ CONTRIBUTIONS

All the authors have contributed equally.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

1. RI Ministry of Health: Indonesian Health Profile. Jakarta (Indonesia): Ministry of Health Republic of Indonesia; 2014.
2. Agustama A. Study of Acute Respiratory Infections (ARI) in Children under Five in the City of Medan and Deli Serdang District. Thesis, University of Sumatera Utara; 2005. p. 1-72.
3. Dirjen PP. Technical Guidelines for Clinical Co-Infection of TB-HIV. Jakarta (Indonesia): Directorate General of Disease Control and Environmental Health, Ministry of Health Republic of Indonesia; 2012.
4. City Health Office: Health Profile of North Sumatera Province in 2012. Medan (Indonesia): City Health Office; 2012.
5. Pani S. Monitoring of the use of Antibiotics ATC/DDD Method and DU 90%: Observational Studies in all Puskesmas of North Gorontalo district. Thesis, Padjajaran University; 2015. p. 35-47.
6. Ratna PD. Evaluation of the Use of Antibiotics Based on the PDD (Prescribed Daily Dose) Method and DDD (Defined Daily Dose) on Inpatients in the Children’s Ward Panembahan Senopati Hospital Bantul Yogyakarta Period January - June 2014. Thesis University of Sanata Dharma; 2015. p. 23-34.
7. Ahyanti M, Duarsa AB. The relation of smoking with the incidence of ARI in students of the Tanjung Karang health-care polytechnic. Public Health J 2013;7:47-51.
8. World Health Organization (WHO). Guidelines for ATC Classification and DDD Assignment. Geneva: WHO; 2015.
9. Gould IM. A review of the role of antibiotic policies in the control of antibiotic resistance. J Antimicrob Chemother 1999;43:459-65.
10. Costa SD, Basri M, Shamsudin N, Basri H. Stability of positively

Table 2: Class of antibiotics

| Class of antibiotics | ATC code | Type of antibiotics | Preparation | Strength of preparation |
|----------------------|----------|---------------------|-------------|-------------------------|
| Cephalosporin        | J01DD08  | Cefixime            | Oral        | 200                     |
|                      | J01DB05  | Cefadroxil          | Oral        | 500                     |
| Macrolide            | J01FA10  | Azithromycin        | Oral        | 500                     |
|                      | J01FA09  | Clarithromycin      | Oral        | 500                     |
| Quinolone            | J01MA12  | Levofloxacin        | Oral        | 500                     |
|                      | J01MA02  | Giprofloxicin       | Oral        | 500                     |

ATC: Anatomical therapeutical chemical

Table 3: Quantity of antibiotic use in ARI patients in DDD/1000 patients-day unit

| ATC code | Type of antibiotics | DDD standards value of the WHO (mg) | DDD/1000 patients-day |
|----------|---------------------|-------------------------------------|-----------------------|
| J01DD08  | Cefixime            | 400                                 | 1223.076              |
| J01FA10  | Azithromycin        | 300                                 | 1897.435              |
| J01DB05  | Cefadroxil          | 2000                                | 265.38                |
| J01MA12  | Levofloxacin        | 500                                 | 115.38                |
| J01MA02  | Giprofloxicin       | 1000                                | 69.23                 |
| J01FA09  | Clarithromycin      | 500                                 | 153.85                |
| Amount   |                     |                                     | 7239.73               |
| Average  |                     |                                     | 1206.62               |

ATC: Anatomical therapeutical chemical, DDD: Defined daily dose

Fig. 2: Characteristics of the patients according to age
charged nanoemulsion formulation containing steroidal drug for effective transdermal application. J Chem 2014;2014:1-8.

11. Marniati M, Yarmaliza Y. Factor Analysis of the Incidence of ARI. National USM Seminar; University of Meulaboh; 2014. p. 2-17.

12. World Health Organization (WHO). Guidelines for ATC Classification and DDD Assignment. Oslo, Norway: WHO Collaborating Center For Drug Statistics Methodology; 2014. Available from: Available from: http://www.whoc. [Last accessed on 2018 Sep 28].

13. American Society of Health-System Pharmacy. AHFS Drug Information. USA: ASHP Incorporation; 2010.

14. Fajarwati AH. Evaluation of the Use of Antibiotics in Acute Respiratory Infections in the Pediatric Group at the Yogyakarta Inpatients Hospital in July-September 2013. Thesis University of Sanatha Dharma; 2015. p. 1-15.

15. Muslim Z. Antibiotic prescription to pediatric in hospital Bengkulu, Indonesia: ATC/DDD Index. Int J Pharm Pharm Sci 2018;10:31-4.

16. Herawati F, Hartono ID, Pranajaya D, Narinda IP. Antibiotic use at primary healthcare centers in Surabaya: A surveillance study. Int J Pharm Pharm Sci 2017;9:41-4.