

THE COMPARISON OF THE EFFICACY OF CEFTRIAXONE AND COMBINATION OF AMPICILLIN-CHLORAMPHENICOL OF CHILDREN WITH PNEUMONIA OF PKU MUHAMMADIYAH HOSPITAL IN BANTUL

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Abstract

Pneumonia is an infectious disease that occurs in the lungs caused by various microorganisms. Patients of children with pneumonia in Indonesia experienced an increase in 2013. Antibiotics therapy is the main therapy for patients with pneumonia. This study aims to compare of the efficacy of ceftriaxone and combination of ampicillin-chloramphenicol of children with pneumonia of PKU Muhammadiyah hospital in Bantul. The study design was a randomized controlled trial with prospective Open trial do in March 2018 to June 2018. The outcomes used were tightness, cough, retraction, temperature, respiration rate, and length of stay. Research data were analyzed using Chi Square test, Fisher test, independent t test and Mann Whitney test. The results of the study of ceftriaxone (n=26) and ampicillin chloramphenicol groups (n=26) showed that the percentage of patients who had not experienced tightness was 82.7%, not cough 7.7%, and there was no retraction of 76.9% with $p < 0.05$. The mean $\pm$ SD temperature of the ceftriaxone group was 36.5 ± 0.12 and the ampicillin chloramphenicol group was 36.57 ± 0.09 with a $p < 0.05$. The mean $\pm$ SD respiration rate of the ceftriaxone group was 27.9 ± 3.22 and the ampicillin chloramphenicol group was 27.92 ± 2.62 with a $p < 0.05$. The mean $\pm$ SD length of stay in the ceftriaxone group was 4.5 ± 0.81 and the ampicillin chloramphenicol group was 4.26 ± 0.66 with a $p < 0.05$. Conclusions showed that there was no significant difference between the effectiveness of ceftriaxone and ampicillin chloramphenicol on fever, spasms, cough, retraction, temperature, respiration rate and length of stay.

Keywords: Children with Pneumonia, Antibiotics Effectiveness, Ceftriaxone Antibiotic, Combination of ampicillin-chloramphenicol, Length of stay

1. INTRODUCTION

Pneumonia is a lung inflammation caused by microorganisms (bacteria, viruses, fungi, parasites) (PDPI, 2003) and overgrowth of microorganisms in lung parenchyma (alveoli) (Alcón et al., 2005). Pneumonia is an infectious disease which is the main cause of death in children under the age of 5 (Unicef, 2017). In the developing countries, 98% of children die because of pneumonia (WHO, 2014). Pneumonia cases occur frequently in South Asia and Sub-Saharan Africa (WHO, 2014). Pneumonia cases in Indonesia have increased in all age groups from 2.1% to 2.7% (Ministry of Health RI, 2013). This research used the ceftriaxone antibiotic therapy and the ampicillin chloramphenicol combination.

Antibiotics therapy is the main therapy for patients with pneumonia. According to the UKK, treatment for pneumonia patients consists of antibiotic therapy and supportive therapy. Antibiotic therapy for under 2 months is recommended ampicillin gentamicin combination. Antibiotic therapy for ages above 2 years is ampicillin, if there is no clinical improvement for 3 days then it is added with chloramphenicol. Second-line therapy is ceftriaxone antibiotics (Sinuraya et al., 2018). Whereas, WHO recommends that if patients present with severe clinical conditions, oxygen is immediately given and ampicillin chloramphenicol or ampicillin gentamicin combination therapy (Afrin, 2016). As an alternative therapy is ceftriaxone. This study used the therapy of ceftriaxone antibiotics and ampicillin chloramphenicol combinations.

2. MATERIALS AND METHODS

This research was an experimental research using a randomized clinical trial (RCT) using an open trial design. The research subjects were patients under the age of 18 who were diagnosed with bronchopneumonia by the doctor in charge. They were treated in the pediatric ward of PKU Muhammadiyah Hospital of Bantul. This research was approved by the health research ethics committee of the regional general hospital of Dr. Moewardi number 268/III/HREC/2018. The informed consent obtained was containing the approval signature form the patient's guardian.

The inclusion criteria were patients under the age of 18 who were diagnosed with bronchopneumonia (ICD-10: J18.0) and had the ceftriaxone antibiotic therapy or the ampicillin chloramphenicol combination. The patients who experienced dismissal or antibiotics replacement were excluded in this research.

Clinical improvements studied were temperature, cough, dyspnea, retraction, respiration rate and length of inpatient stay. Comparison of the effectiveness of therapy between ceftriaxone and ampicillin chloramphenicol antibiotics was analyzed statistically. The statistical test was performed using Chi-Square Test, Fisher Test, Independent t-test and Mann-Whitney Test.

3. RESULT AND DISCUSSION

3.1. Result Research

There were 56 pediatric patients under the age of 18 who were diagnosed with bronchopneumonia from March 2018 to June 2018 in the pediatric ward of PKU Muhammadiyah Hospital of Bantul. There were 52 patients who were included in the inclusion criteria. The demographic data can be seen in Table 1.

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Table 1 Characteristics, clinical symptoms and initial vital signs of pediatric pneumonia patients at PKU Muhammadiyah Hospital Bantul before being given ceftriaxone and ampicillin chloramphenicol therapy

Characteristics	Total number (%)	Ceftriaxone Group (n=26)	Ampicillin Chloramphenicol Group (n=26)	P
Gender (n, %)				
Man	34 (65,4)	18 (69,2%)	16 (61,5%)	0,560 ^a
Woman	18 (34,6)	8 (30,8%)	10 (38,5%)	
Age (Median(min-max))		19,5 (4-99)	23,5 (4-100)	
0-12 month	18 (34,6)	10 (38,5%)	8 (30,8)	0,799 ^d
13-36 month	23 (44,2)	10 (38,5%)	13 (50%)	
37-60 month	7 (13,5)	4 (15,4%)	3 (11,5%)	
61-144 month	4 (7,7)	2 (7,7%)	2 (7,7%)	
Clinical Symptoms (%)				
-Fever				
Yes	29 (55,8)	18 (69,2)	11 (42,3)	0,051 ^a
No	23 (44,2)	8 (30,8)	15 (57,7)	
-Dyspnea				
Yes	32 (61,5)	16 (61,5)	16 (61,5)	1 ^a
No	20 (38,5)	10 (38,5)	10 (38,5)	
-Cough				
Yes	51 (98,1)	26 (100)	25 (96,2)	1 ^b
No	1 (1,9)	0	1 (3,8)	
-Retraction				
Yes	42 (80,8)	19 (73,1)	23 (88,5)	0,159 ^a
No	10 (19,2)	7 (26,9)	3 (11,5)	
Vital Sign (Mean±SD(min-max))				
Temperature (°C)		37,61±0,866 (36,6-40)	37,6±0,8 (36,6-39,8)	0,869 ^c
Respiration Rate (times/minute)		37,92±12,46 (24-65)	34,69±7,45 (26-56)	0,754 ^d

* a=Chi Square, b=Fisher, c=T test independent, d=Mann Whitney.

The number of pneumonia occurrence in male patients was 34 (65.4%) while the pneumonic occurrence in female patients was 18 (34.6%). Toddlers (1-3 years), in the group of age one to three years old contributed the highest number of pediatric patients with pneumonia, 23 (44.2%). It is followed by baby group (0-12 month) with total number of 18 (34.6%), preschool group (37-60 month) with the total number of seven (13.5%), and grade school group (61-144 month) with total number of four (7.7%).

The effectiveness of the antibiotic therapy can be seen in Table 2 in the form of categorical data of clinical improvements such as dyspnea, cough and retraction. The categorical data was analyzed using Chi Square Test and Fisher's Test to identify the difference between patients receiving ceftriaxone therapy and patients receiving ampicillin chloramphenicol therapy. The result of Table 2 shows the percentage of the patients still experiencing dyspnea 11.5% and 23%, cough 92.3% and 92.3%, and retraction 19.2% and 26.9% for each group of ceftriaxone and ampicillin chloramphenicol. The analysis result of

these three categorical data shows that there is no significant difference between ceftriaxone group and ampicillin chloramphenicol group for the improvement of dyspnea, cough and retraction.

Table 2 Effectiveness on clinical symptoms after ceftriaxone and ampicillin chloramphenicol therapy (n=52)

Clinical Symptoms	Ceftriaxone Group (n=26)		Ampicillin Chloramphenicol Group (n=26)		Total		P
	n	%	n	%	n	%	
Fever							
No fever	26	100	26	100	52	100	-
Still fever	0	0	0	0	0	0	
Dyspnea							
No dyspnea	23	88,5	20	76,9	43	82,7	0,465 ^b
Still dyspnea	3	11,5	6	23,1	9	17,3	
Cough							
No cough	2	7,7	2	7,7	4	7,7	0,695 ^b
Still cough	24	92,3	24	92,3	48	92,3	
Retraction							
No retraction	21	80,8	19	73,1	40	76,9	0,510 ^a
Still retraction	5	19,2	7	26,9	12	23,1	

* a=Chi Square, b=Fisher's

The effectiveness of an antibiotic therapy for clinical improvements in the form of numerical data of temperature and respiration rate can be seen in Table 3 and Table 4.

Table 3 Body temperature after therapy with ceftriaxone (n=26) and ampicillin chloramphenicol (n=26)

	Ceftriaxone Group (n=26)	Ampicillin Chloramphenicol Group (n=26)	P
Mean±SD	36,5 ⁰ C ±0,12	36,57 ⁰ C ±0,09	0,471
Min-Max	36,4 ⁰ C-36,9 ⁰ C	36,4 ⁰ C-36,8 ⁰ C	

* Mann Whitney

The numerical data was analyzed using Mann-Whitney Test. Table 3 shows the temperature result of ceftriaxone group, 36.5⁰C±0.12 (36,4⁰C-36,9⁰C) and ampicillin chloramphenicol group, 36.57⁰C±0.09 (36,4⁰C-36,8⁰C). The decrease in temperature after giving the therapy for both groups show no significant difference.

Table 4 Respiration rate after therapy with ceftriaxone (n=26) and ampicillin chloramphenicol (n=26)

	Ceftriaxone Group (n=26)	Ampicillin Chloramphenicol Group (n=26)	P
Mean±SD	27,9±3,22	27,92±2,62	0,741
Min-Max	24 -36 times/minute	22-37 times/minute	

* Mann Whitney

Table 4 shows the result of respiration rate of ceftriaxone group is 27.9 ± 3.22 (24-36) and ampicillin chloramphenicol group is 27.9 ± 3.22 (22-37). The value of respiration rate after giving the therapy for both groups show no significant difference ($p < 0.05$).

Data on the length of inpatient stay is numerical data analyzed using Mann-Whitney Test. Table 5 shows that the length of inpatient stay of ceftriaxone group is 4.5 ± 0.81 (4-6) while ampicillin chloramphenicol group is 4.26 ± 0.66 (3-6).

Table 5 Comparison of Length of Stay (LOS) in pediatric pneumonia patients treated with ceftriaxone (n=26) and ampicillin chloramphenicol (n=26).

	Ceftriaxone Group (n=26)	Ampicillin Chloramphenicol Group (n=26)	P
Mean±SD	4,5±0,81	4,26±0,66	0,461
Min-Max	4-6 days	3-6 days	

* Mann Whitney

The value of length of inpatient stay after giving the therapy for both groups show no significant difference ($p < 0.05$).

3.2. Discussion

A treatment for pneumonia patients consists of antibiotic therapy and supportive therapy (PDPI, 2003). Several literatures recommend a therapy of ampicillin or penicillin antibiotic with gentamicin for the severe pneumonia which is given to patients under the age of two months and a therapy of ampicillin for patients with over the age of two months, if their clinical condition is getting worse before 48 hours then chloramphenicol is added. Ceftriaxone can be used as a second line therapy if the treatment with a first line fails (Anonymous, 2008; Rahman et al., 2014; Sinuraya et al., 2018). The antibiotics used in this research are ceftriaxone and ampicillin chloramphenicol. The result research shows that highest percentage of pediatric patients with pneumonia is male, 65.4%. The 2015 medical profile of Yogyakarta City is reported that in 2014, the number of pneumonia case in male toddler was higher (290 patients) than in female toddler (225 patients) (Health Office, 2015). Male toddler patients tend to have slower growth of body cells compared to female toddler patients, so it affects the maturity of the patient's body organs. Due to the slow growth of body cells and the maturity of body organs, male toddlers are more susceptible to contracting and experiencing infectious diseases, one of them is pneumonia (Juvén et al., 2003).

The percentage of pediatric pneumonia patients in toddler group (1-3 years) is 44.2%, followed by baby group (0-12 months), 34.6%. Basic Health Research of 2013 shows that the highest number of pneumonia occurrence is in the age group of one to four years (Ministry of Health RI, 2013). Babies and toddlers have a lower body defense mechanism compared to adults. Therefore, toddlers belong to groups that are vulnerable to infectious diseases such as influenza and pneumonia. Children aged 0-24 months are more susceptible to pneumonia than children aged over 2 years. It is because of their incomplete immunity and respiratory tract which is relatively narrow (Sinuraya et al., 2018).

Some clinical symptoms that can be found in pneumonia patients are cough, rhinorrhea (Wulandari, 2016), fever $>37.5^{\circ}\text{C}$, tachypnea (rapid breathing), dyspnea (breathless), malaise (limp), retraction and cyanosis (Sinuraya et al., 2018). The research result shows no

significant difference in giving the therapy of ceftriaxone and the therapy of ampicillin chloramphenicol antibiotics combination to the symptoms of clinical signs of breathless, cough and retraction. Sinuraya et al (2018) state that for toddler pneumonia patients, there are more than 50% of patients who are experiencing breathlessness and 82.1% of patients who are still experiencing it after the antibiotics therapy is given (Sinuraya et al., 2018). The research by Rehman et al (2017), shows that there are 90 % of pediatric pneumonia patients who do not experience retraction after the rational antibiotic therapy is given (Rehman & Shah, 2017).

In this research, the decrease in the value of body temperature and respiration rate of both groups shows no significant difference. Cetinkaya et al conclude that the mean body temperature of pediatric patients of pneumonia in the last day is 36,7⁰C while the mean respiration rate of pediatric patients of pneumonia in the last day is 24 times/minute (Cetinkaya et al., 2004). The length of inpatient stay is also one of the things that can be used to determine the effectiveness of an antibiotic. The analysis result shows that there is no significant difference among both groups.

4. CONCLUSION

Conclusions showed that there was no significant difference between the effectiveness of ceftriaxone and ampicillin chloramphenicol on fever, spasms, cough, retraction, temperature, respiration rate and length of stay.

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