

***Klebsiella pneumoniae* IDENTIFICATION OF PRODUCING EXTENDED SPECTRUM BETA LACTAMASE (ESBL) AND RESISTANCE PATTERN OF ANTIBIOTICS IN ULIN GENERAL HOSPITAL BANJARMASIN**

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Abstract: *Klebsiella pneumoniae* (*K. pneumoniae*) can synthesize beta lactamase enzymes that have the ability to open lactam beta rings and cause resistance to antibiotics such as amoxicillin, third generation cephalosporins namely cefotaxim, ceftazidim, ceftriaxone and monobactam groups such as aztreonam. Extended spectrum beta lactamase (ESBL) is a plasmid enzyme that mediates the occurrence of hydrolysis and inactivation of beta lactam antibiotics. Infections caused by ESBL-producing bacteria become a serious problem for hospitals worldwide. ESBL isolate susceptibility tests against antibiotics are required to provide a sensitivity pattern that can be used as a reference in more rational antibiotic selection. This study was conducted to describe the prevalence of ESBL group *K. pneumoniae* and antibiotic resistance pattern at Ulin General Hospital Banjarmasin. The method of this research used secondary data material in the form of reporting document of antibiotic sensitivity test result that isolation and identification using VITEK 2, and then be analyzed using Microsoft Excel. The culture examination toward 50 patients in the Dahlia ward, Ulin General Hospital Banjarmasin was taken from January until May 2017, with the results are from 24 data *Staphylococcus aureus* (*S. aureus*) isolate, more than half of it are ESBL group (54.16%). The results of sensitivity test of *K. pneumoniae* of ESBL positive to antibiotic group were found to be antibiotics that still have > 90% sensitive were meropenem (100%), amikacin (100%), tigecycline (92.85%), ertapenem (92.86%). The antibiotics with resistance > 50% was found in ampicillin antibiotics (100%), ceftriaxone (78.5%), ceftazidime (64.28%), cefepime (57.14%) and aztreonam (71.4%). As for ESBL negative results obtained sensitive > 90% for all antibiotics except ampicillin, ampicillin / sulbactam, and nitrofurantoin. Meropenem (100%), amikacin (100%), tigecycline (92.85%), ertapenem (92.86%) are antibiotic choices that are still sensitive to ESBL infection

Keywords: antibiotic resistance, ESBL pattern, Vitek 2

INTRODUCTION

Antibiotics have been used for a long time to treat infectious diseases, but lately they tend to be excessive and irrational, resulting in an increased prevalence of antibiotic resistance in initially sensitive bacteria. Bacterial resistance to antibiotics has become a worldwide health problem, with many adverse effects that could degrade the quality of health care. Results of *Antimicrobial Resistant research in Indonesia* (Amrin) 2000-2005 proved that the problem of antibiotic resistance also occurs in Indonesia.^{1,2}

Various studies have shown that the number of pathogenic bacterial resistance increases sharply, so that morbidity and mortality rates are also increasing. The main cause of resistance in gram-negative bacteria is the *extended-spectrum beta-lactamase* (ESBL) in *Klebsiella pneumoniae* and *Escherichia coli*. Amrin research results found that the incidence of ESBL in Indonesia is quite high at 36% in *Klebsiella pneumonia* and 29% in *E.coli*.^{3,4}

Klebsiella pneumoniae belonging to the genus *Klebsiella* in *Enterobacteriaceae* family. These bacteria can be isolated from the gastrointestinal tract, the eye, the respiratory tract and the genitourinary tract of a healthy person. *Klebsiella pneumoniae* is known to cause several types of infections such as pneumonia, urinary tract infections, bacteremia, an infection in the wound or incision and meningitis. Patients who usually get these bacterial infections are hospitalized patients because of other diseases, who use ventilators, infusions and get old antibiotic therapy.^{5,6,7}

Klebsiella pneumoniae can synthesize *beta-lactamase* enzymes which have the ability to open the beta-lactam ring and cause resistance to antibiotics such as amoxicillin, which is a third generation cephalosporin cefotaxime, ceftazidim, ceftriaxone and groups such as the monobactam aztreonam. *Extended-spectrum beta-lactamase* (ESBL) is an enzyme plasmid meperantarai the hydrolysis and inactivation of beta-lactam

antibiotics. Infection caused by ESBL-producing microorganisms becomes a serious problem for hospitals worldwide.^{1,4,8}

Several studies in the world find *K. pneumoniae* ESBL producers by 10-40%, which is in Latin America reported a 45.4%, the Western Pacific 24.6%, Europe 22.6%, USA 7.6% and Canada 4.6%.³ Chandra Research has isolated 37 isolates *K. pneumoniae* in Jakarta and Karawaci and prevalence *K. pneumoniae* producing ESBL amounted to 33.03%. In addition, research Irawan et al⁴ also found that the type of ESBL-producing bacteria that cause sepsis was highest *K. pneumoniae* (52.08%). The last few years showed that ESBL-producing *Klebsiella pneumoniae* isolates increased.^{1,3,4,9}

The identification of ESBL-producing *Klebsiella pneumoniae* is indispensable for improved management and antibiotic therapy for infection control. Research on ESBL-producing bacteria in Indonesia is still not done much. Therefore the study would examine the prevalence of species description ESBL-producing *Klebsiella pneumoniae* and resistance patterns antibiotic Ulin General Hospital Banjarmasin.⁶

RESEARCH METHODS

This research is a retrospective description research, data obtained from Clinical Pathology Laboratory of microbiology subunit and medical record Ulin General Hospital Banjarmasin Hospital. Samples are material secondary data reporting documents antibiotic sensitivity test results on *pneumoniae* isolates *Klasbsiella* species ranging from January to May 2017 isolation and identify them using the VITEK 2.

Secondary data obtained from Clinical Pathology Laboratory of tropical infection infectious subunit is patient identity, specimen type, treatment room, ESBL result, and antibiotic susceptibility test result. Data is analysed using

Microsoft Excel and the results will be displayed in table form.

RESULTS AND DISCUSSION

Based on the results of the study during the period of January 2017-May 2017 obtained data as in Table 1.

Table 1. Characteristics of ESBL samples in Dahlia Ward, Ulin General Hospital Banjarmasin in 2017

Variabel	ESBL		Total
	Positif	Negatif	
Golongan <i>K.pneumoniae</i>	14 (54,16%)	11(45,84%)	24
Jenis kelamin			
Laki-laki	16(88,8,%)	2(11,1%)	18
Perempuan	5 (83,3%)	1(16,6%)	6
Umur (Tahun)			
17-30	2 (50%)	2 (50%)	4
30 – 60	10 (66,6%)	5 (33,3%)	15
>60	5 (100 %)	0 (0%)	5
Jenis spesimen			
Sputum	12(54,54%)	10 (45,4%)	22
Cairan pleura	1(50%)	1(50%)	2

Source: Clinical Pathology Laboratory of Ulin General Hospital Banjarmasin (May 2017)

The examination's results of the culture cells that were growth in Dahlia Ward from 50 patients had a 24 isolates *K.pneumoniae* showed more than half of a class of ESBL (54.16%). ESBL isolates from male patients were higher than female patients, ranging in age from 17-80 years and most age groups were young adults 30-60 years old. Gender allegedly influential because of men have activity and mobility higher

than women so susceptible to contracting. Age also gives affect because it can be attributed to a person's immune factor. The increasing age then the immunity tends to decrease. The isolates of *K.pneumoniae* mostly come from sputum specimens are 22 isolates with the amount of ESBL positive equal to 54,54%. The results of bacterial susceptibility tests against some antimicrobials are presented in Table 2.

Table 2. ESBL sensitivity test results on antimicrobials

Antibiotics	ESBL Positive				ESBL Negative			
	R (%)	I (%)	S (%)	n	R (%)	I (%)	S (%)	N
Ampicillin	100	0	0	14	100	0	0	11
Ampicilin / Sulbactam	50	14.2	35.7	14	45.4	0	54.5	11
Piperacillin / tazobactam	14.28	0	85.7	14	9.1	0	90.9	11
Ceftazidime	64.28	0	35.7	14	9.1	0	90.9	11
Ceftriaxone	78.5	7.14	14.2	14	9.1	0	90.9	11
Cefepime	57.14	0	42.85	14	9.1	0	90.9	11
Aztreonam	71.4	0	28.6	14	0	0	100	11
Ertapenem	7.14	0	92.86	14	18.2	0	81.8	11
Meropenem	0	0	100	14	18.2	0	81.8	11
Amikacin	0	0	100	14	0	0	100	11
Gentamicin	21.43	0	78.57	14	9.1	0	90.9	11
Ciprofloxacin	14.29	0	85.71	14	9.1	0	90.9	11
Tigecycline	0	7.15	92.85	14	0	0	100	11
Nitrofurantoin	14.28	14.2	71.42	14	27.8	0	72.7	11
Trimethoprim / Sulfamethoxazole	35.72	0	64.28	14	1	4	95	11

The sensitivity test results of *K.pneumoniae* ESBL positive groups to antibiotics still has sensitive > 90% meropenem (100%), amikacin (100%), tigecycline (92.85%), and ertapenem (92.86%). Meropenem and ertapenem are antibiotic from beta lactam groups based on their chemical structure. Resistance > 50% is found in antibiotics: ampicillin (100%), ceftriaxone (78.5%), ceftazidime (64.28%), cefepime (57.14%) and aztreonam (71.4%). Meanwhile, for a negative ESBL obtained a sensitivity > 90% for all antibiotics except ampicillin, ampicillin / sulbactam, and nitrofurantoin (Table 2). This is probably caused by antibiotics that are generally widely used as empirical therapy to almost all of patients irrationally. Ampicillin is widely used freely by all patients without supervision and evaluation by the physician so that it is suspected of causing resistance to ESBL. In general, the cause of resistance is also caused by the easy access to get antibiotics, poor adherence to antibiotics, hygiene and sanitation in health care facilities.

CONCLUSIONS

The prevalence of ESBL in Ulin General Hospital is increasing from previous studies. The meropenem (100%), amikacin (100%), tigecycline (92.85%), ertapenem (92.86%) are antibiotic choices that are still sensitive to ESBL infection. Based on the results of the study, it is hoped that the control and prevention of ESBL infection by giving more attention to patients who have ESBL infection risk factors such as patients treated in intensive care, postoperative, long-hospitalized patients and patients using many medical devices; carry out infection prevention and control programs in each room such as washing hands, using personal protective equipment, taking care of the sterility of equipment and room facilities to prevent the transfer of germs from one patient to another or from health-care workers to patients; pay attention to the selection and the use of rational antibiotics to reduce resistance; as well as evaluation and monitoring of antibiotic use should be undertaken to control and prevent increased ESBL incidence.

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