THE RESISTANCE OF THE GRAM-NEGATIVE RODS ISOLATED FROM CLINICAL CASES IN VIETNAM TO DORIPENEM

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Key words: Doripenem, susceptibility testing

BACKGROUND

In Vietnam, there have been many studies on the resistance of clinical isolated Gram [-] rods to imipenem and meropenem. For doripenem, the COMPACT II was recently reported as a multinational studv investigating the doripenem resistance of gram negative rods isolated from hospitals in many countries in Asia, including Vietnam. However, the resistant data received from COMPACT II related to Vietnam was based on the quite small amount of isolates, so it is difficult to accurately reflect the in vitro efficacy of doripenem on the clinical isolate.

AIMS

Investigate the situation of the resistance to doripenem of the high number of gram negative rods collected from different hospital in Vietnam and these strains were isolated from inpatients with infections.

MATERIALS – METHODS

The objects of the study are the facultative Gram-negative rods including E. coli, K. Proteus, Enterobacter, pneumoniae, Ρ. aeruginosa, and A. baumannii isolated from different infections including septicemia (BSI), urinary tract infection (UTI), intra-abdominal infections (IAI) and lower respiratory tract infection (LRI). The strains were collected from different hospital in Hochiminh city and in Hanoi. The method of susceptibility testing was the determination of MIC using Etest (Biomerieux) and the procedure was followed the manufacturer. The E. coli ATCC 25922 and P. aeruginosa ATCC 27853 were used to quality control. The interpretation standard of CLSI 2016 was used to interpret the received results of MIC. Beside Etest, the synergistic effect of the combination doripenem+colistin and doripenem+tigecycline on the XDR A. baumannii was also investigated and the method for this testing was the chess-board procedure on the 96 micro-well plate.

RESULTS - DISCUSSIONS

From June 2015 to March 2016, 1323 isolates were collected and involved in the study. These strains included 520 *E. coli*, 330 *K. pneumoniae*, 97 *Enterobacter*, 58 *Proteus*, 173 *A. baumannii*, and 145 *P. aeruginosa.* The origin of the strains were isolated from inpatients with different infections including septicemia (360), intra-abdominal infection (195), lower respiratory tract infection (419) and urinary tract infection (349).

The received results of doripenem MIC showed that 7% of Enterobacteriaceae were resistant to doripenem with MIC₅₀ and MIC₉₀ was 0.032μ g/ml and 0.25μ g/ml, respectively. The ratio of doripenem resistance of *P. aeruginosa* was 43.5% with MIC₅₀ và MIC₉₀ were 1.5 and 32μ g/ml, respectively. The ratio of doripenem resistance of *A. baumannii* was 77.5% với MIC₅₀ and MIC₉₀ was over 32μ g/ml.

The origin and the resistance ratio of the studied strains as well as the MIC_{50} and MIC_{90} of doripenem to the tested strains were demonstrated in detail in *table 1*.

There were 118 strains of A. baumannii with XDR were selected from the study to enter the investigation of the synergistic effect of two antibiotic combinations; doripenem+colistin doripenem+tigecvcline. The received and results showed that the combination of doripenem+colistin gave the synergistic effect on 89.8% of MDR A. baumannii, and the synergistic effect of doripenem+tigecycline was 83.9%. There were 100% of A. baumannii resistance to doripenem became sensible to doripenem if the concentration of colistin was 2µg/ml in the combination, and this ratio decreased to 42.3% if the concentration of colistin was 1µg/ml, to 35.1% if the concentration of colistin was 0.5µg/ml, and to 6.6% if the concentration of colistin was 0.25µg/ml. The study also reported that 16.2% of *A*. baumannii resistance to doripenem became sensible to doripenem if synergistic effect the existed in the combination doripenem+tigecycline.

	Specimens								τοται				
	BSI		IAI		LRI		UTI		TOTAL			MIC ₅₀	MIC90
	No	R	No	R	No	R	No	R	No	R	%R		
E. coli	136	1	122	1	62	4	200	3	520	9	1.73	0.032	0.064
K. pneumoniae	102	15	40	1	135	19	53	9	330	44	13.33	0.047	6
Enterobacter	44	4	8	1	28	0	17	3	97	8	8.25	0.047	0.25
Proteus	3	2	2	0	29	7	24	0	58	9	15.52	0.064	6
A. baumannii	55	37	7	4	87	71	24	22	173	134	77.46	>32	>32
P. aeruginosa	20	11	16	4	78	36	31	12	145	63	43.45	1.5	>32
Total	360	70	195	11	419	137	349	49	1323	267			

Table 1: The origin and the resistance ratio of the studied strains as well as the MIC₅₀ and MIC₉₀ of doripenem to the tested strains

BSI: Blood site infections; **IAI**: Intra-abdominal infections, **LRI**: Lower respiratory tract infections, **UTI**: Urinary-tract infections

CONCLUSION

This study can be considered as the first study to investigate the resistance to doripenem of the high number of Gram negative rods isolated from in-patients with septicemia, intra-abdominal infection, urinary tract infection and lower respiratory tract infection in Vietnam. The received and analyzed results were the essential data and information for clinical to consider selecting the appropriate antibiotic for treatment of infections causing by the Gram-negative rods.

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