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Short communication

Antibiotic Resistance Rates of Colistin Resistant Gram-Negative Bacteria and a Comparison of Etest and VITEK2 in Evaluation of Colistin Resistance

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Abstract

In the present study we aimed to investigate antibiotic resistance rates in colistin resistant bacteria; and also to compare two methods (Etest and VITEK 2) for detection of colistin resistance. A total of 56 strains were defined as colistin resistant according to VITEK2. Among the 56 colistin resistant strains, only 40 (71.4%) of them were defined as resistant according to Etest method. 34 (85%) out of these 40 strains were identified as *K. pneumoniae*. The resistance rates were detected for ciprofloxacin, meropenem and ceftazidime as 100%, 97.5% and 95% respectively for all colistin resistant strains. Among the 16 colistin susceptible strains, the resistance to ciprofloxacin, meropenem and ceftazidime were found as 100%, 87.5% and 81.25 respectively.

Keywords: colistin, multi drug resistance, Etest, VITEK2

Резюме

Целта на настоящото изследване е да се проучи степента на резистентност към антибиотиците в резистентни към колистин бактерии и да се сравнят два метода - Etest и VITEK 2 за тяхното определяне. Чрез VITEK2 са установени 56 щама, устойчиви на колистин. От тези 56 щама, резистентни на колистин по метода на Etest са определени като резистентни само 40 (71,4%). Тридесет и четири (85%) от тези 40 щама са идентифицирани като *Klebsiella pneumonia*e. роцентът на резистентност към ципрофлоксацин, меропенем и цефтазидим е съответно 100%, 97,5% и 95% за всички щамове, устойчиви на колистин. От 16-те чувствителни към колистин щамове, резистентността към ципрофлоксацин, меропенем и цефтазидим е съответно 100%, 87,5% и 81,25%.

Introduction

The emergence of multiple antibiotic resistance (MAR) is a major clinical concern, which has become a serious problem worldwide. Because of the high prevalence of infections caused by MAR Gram-negative bacteria, colistin became the last-resort therapy for many infections especially for the treatment of carbapenem resistant *Enterobacteriaceae* and non-fermenting Gram-negative bacilli. However, for the past ten years, resistance to colistin has become a threatening issue mediated by both chromosomal mutations and also transmission of plasmid (Falagas *et al*., 2005; Li *et al*., 2006a, 2006b; Castanheira *et al*., 2016; Clifford *et al.*, 2016; Rojas *et al.,* 2017). Microdilution method is defined as the reference method for detection of colistin resistance. It is not possible to perform broth dilution test routinely for most laboratories; therefore, automized systems are frequently be-

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ing used for detection of colistin resistance. In the present study we aimed to investigate antibiotic resistance rates in colistin resistant strains, and to compare two different methods (gradient test and VITEC2) used for detection of colistin resistance.

Materials and Methods

All Gram-negative bacteria isolated from different clinical samples of patients who were admitted to different departments of Istanbul Yeni Yuzyil University training Hospital Gaziosmanpasa between June 2015 and June 2017 were included in the present study. VITEK 2 Compact ®(BioMérieux, France) was used for identification and antimicrobial susceptibility testing. The resistance of colistin was compared with Etest (BioMérieux, France) according to CLSI guidelines. A strain was defined as colistin resistant if it was detected by Etest.

Results and Discussion

A total of 56 strains were defined as colistin resistant, of which 45 (80%) were identified as *K. pneumoniae* (Table 1). Ciprofloxacin, meropenem and ceftazidime were found to be the most resistant antibiotics (Table 1) for three different bacteria groups. Among the 56 colistin resistant strains, only 16 (28.6%) were defined as susceptible according to the E-test method (Table 2).

Because almost all colistin resistant isolates are also resistant to other broad spectrum antibiotics, resistance to colistin is a big concern, as it leaves clinicians with almost no options to manage such extensively resistant infections. Detection of colistin resistance by VITEK2 needs to be confirmed by other methods such as Etest. Besides, because of the discordant results from E-test and VITEK2, it is very important to investigate the presence of resistance genes with PCR.

Table 1. Antibiotic resistance ratios of colistin resistant Gram-negative bacteria

Bacteria	Antibiotics											
	Amikacin n (%)		Meropenem n (%)		Ceftazidime n (%)		Ciprofloxacin n (%)		Trimethoprim / Sulphametoxasole n (%)		Tigecycline n (%)	
	R	I	R	I	R	I	R	I	R	I	R	I
K. pneumoniae (n=45)	10 (22.2)	28 (62.2)	42 (93.3)	3 (6.6)	43 (95.5)	2 (4.4)	45 (100)	0	35 (77.7)	0	7 (15.5)	11 (24.4)
A. baumannii (n=6)	6 (100)	0	6 (100)	0	6 (100)	0	6 (100)	0	4 (66.6)	0	1 (16.6)	4 (66.6)
P. aeroginosa (n=5)	5 (100)	0	5 (100)	0	2 (40)	2 (40)	5 (100)	0	*	*	*	*
Total (n=56)	21 (37.5)	28 (50)	53 (94.6)	3 (5.4)	51 (91)	4 (7.1)	56 (100)	0	39 (69.6)	0	8 (14.3)	15 (26.8)

* These antibiotics were not been tested for *P. aeruginosa*.

Table 2. Comparison of E-test and VITEK2 results for colistin resistance

Bacteria	VITEK 2				Gradient test (Etest)				Consistency of resistance %
	2-<4	4-8	≥16	≤1	1-<4	4-8	>8-16	≥16	
K. pneumoniae	0	6	39	2	10	26	4	3	75.5
A. baumannii	0	2	4	0	3	2	1	0	83.3
P. aeruginosa	0	0	5	1	2	1	1		20

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