Resistance - Polymyxin E in *Acinetobacter baumannii* Isolated from Patients in the Wound Unit

Dear Editor,

Polymyxin E is the last antibiotic effective against multidrug-resistant (MDR) *Acinetobacter baumannii* infections. It disorders bacterial cell membranes, leading to cell death, but it has significant nephrotoxicity. Due to the rise of resistant strains for colistin, its clinical use requires careful monitoring and consideration of combination therapies.[1] This study aimed to identify resistance genes (mcr), assess prevalence, and analyze factors driving resistance to guide better antibiotic use and control its spread in healthcare settings. Three hundred specimens were collected for culturing from patients who were admitted to the Al-Hilla Teaching Hospital for the period between May 2023 and March 2023 among which only 20 specimens possessed *A. baumannii* isolates carrying the mobilized colistin resistance gene (MCR) genes. The results showed that with conventional polymerase chain reaction for the detection of mcr genes, the amplicon of five genes (mcr-1 to mcr-5) ranged from 320 bp to 1644 bp as shown in Table 1. Most of the specimens in this study were carrying the mcr 4 gene – 15 (75%) and then mcr 5 gene – 11 (55%), whereas in another study by Kareem,[2] mcr 1 gene was detected in 11% of the isolates out of 205 samples; however, mcr 2 and mcr 3 were not detected; another study by Hameed *et al*.[3] found that mcr 1 in *A. baumannii* was 16.6% while the present study also found 15% with mcr 1 gene. In contrast, the commonness of mcr-1 has been studied in *Klebsiella pneumoniae* and *Escherichia coli.* Snyman *et al*.[4] and other studies by Al-Kadmy *et al*.[5] detected mcr-1, mcr-2, and mcr-3 genes in 89 (73.5%), 78 (64.5%), and 82 (67.8%) out of 121 *A. baumannii* isolates, respectively. The relatively recent development and high prevalence of polymyxin E-resistant *A. baumannii* isolates create therapeutic despair and guide for the use of combination therapies for treatments of MDR *A. baumannii.*

Table 1: Primer names and their amplicons used in this study

Primer names	Amplicons (bp)
mcr1	320
mcr2	715
mcr3	929
mcr4	1116
mcr5	1644

Table 2: The percentage of colistin resistance genes in this study

Colistin resistance genes	Percentage
mcr-1	3 (15)
mcr-2	2 (10)
mcr-3	1 (5)
mcr-4	15 (75)
mcr-5	11 (55)

The current study showed mcr-4 was predominant, followed by mcr-5, and at last mcr-1 and mcr-2, and finally, mcr-3, as in Table 2. The results of the present study on the analysis of the Acinetobacter blaOXA-51 gene sequence showed that there was a mutation in 5 specimens with the *Acinetobacter blaOXA-51* gene. All five isolates carrying mcr-4 and mcr-5 have high resistance against antibiotics registered in NCBI under accession numbers (LC600868, LC600869, LC600870, LC600871, and LC600872).[6] Available on the NCBI Reference Sequence. The (five) *A. baumannii* isolates were carrying the *blaOXA-51* genes with identities (90%, 92%, 93%, 98%, and 99%, respectively). On the basis of the evidence by sequencing, it was postulated that all the (five) *A. baumannii* isolates from wound were found to belong to the species *A. baumannii.* In conclusion, the detection of multiple mcr genes, particularly mcr-4 and mcr-5, highlights a growing resistance issue. In addition, five isolates with mutations in the blaOXA-51 gene, combined with the presence of mcr-4 and mcr-5, exhibited higher resistance. This underscores the need to explore alternatives to colistin or implement combination therapies for the best treatment.

Declaration of patient consent

The authors confirm that they have obtained all appropriate patient consent forms.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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