JIDC | THE JOURNAL OF INFECTION IN DEVELOPING COUNTRIES

Letter to the Editor

Alarming increase in carbapenemase-producing *Klebsiella* spp causing bloodstream infections in pediatric population in India

Agila Kumari Pragasam[1], Chaitra Shankar[1], Shalini Anandan[1], Valsan Philip Verghese[2], Balaji Veeraraghavan[1]

[1] *Department of Clinical Microbiology, Christian Medical College, Vellore, India*
[2] *Department of Child Health, Christian Medical College, Vellore, India*

Key words: Carbapenemase; pediatrics; *Klebsiella* spp; blood stream infections.

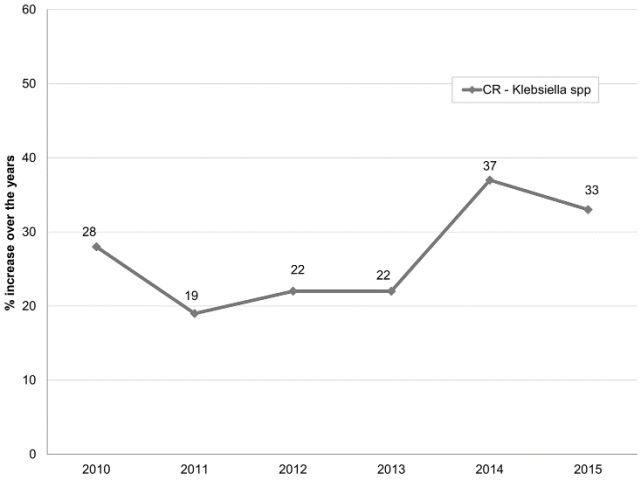
J Infect Dev Ctries 2017; 11(9):736-737. doi:10.3855/jidc.8038

(Received 24 December 2015 – Accepted 10 February 2016)

Dear Editor,

Carbapenemases are a versatile group of β-lactamases characterized by their resistance to virtually all β-lactam antibiotics, including cephalosporins and carbapenems. This retrospective study was conducted to monitor the change in the trend of carbapenem-resistant (CR) *Klebsiella* spp causing bloodstream infections (BSI) in patients ≤15 years of age during January 2010 to November 2015 at Christian Medical College, Vellore, South India. Antimicrobial susceptibility testing was done by disk diffusion method as per CLSI guidelines, and isolates that were resistant to both imipenem and meropenem were included in the analysis. All the CR-*Klebsiella* spp were characterized by both phenotypic and molecular methods for carbapenem resistance. The total of *Klebsiella* spp isolated from BSIs over a five year period were as follows: 29 (2010), 77 (2011), 49 (2012), 45 (2013), 78 (2014) and 27 (2015). Of these, CR rates were found to be 28% (n = 8/29), 19% (n = 15/77), 22% (n = 11/49), 22% (n = 10/45), 37% (n = 29/78) and 33% (n = 9/27) in 2010 to 2015, respectively. Most of the CR *Klebsiella* spp exhibited co-resistance to penicillins, cephalospotins and other classes of drugs, except colistin and tigecycyline. Among the CR*Klebsiella* spp, 39 isolates were randomly chosen and screened for the carbapenemases genes bla_{NDM}, bla_{SPM}, bla_{IMP}, bla_{VIM} and $bla_{Oxa\text{-}48\ like}$ [1]. Of the 39 isolates tested, 27, 3, 4 and 1 isolates were positive for bla_{NDM}, $bla_{Oxa\text{-}48\text{-}like}$, $bla_{NDM+Oxa\text{-}48\text{-}like}$ and $bla_{NDM+VIM}$ genes, respectively. Four isolates were negative for all the five genes tested. Notably, sequencing of two each of bla_{NDM} and $bla_{Oxa\text{-}48\text{-}like}$ positives revealed that all sequenced isolates contained $bla_{NDM\text{-}1}$ and $bla_{Oxa\text{-}181}$ gene variants, respectively. A similar observation was seen in the adult population as well (unpublished data), which points towards a local transmission of these gene variants within the hospital. Such local dissemination of resistant genes in the hospital and community increases the CR *Enterobacteriaceae* rates over the years. Among the isolates tested, bla_{NDM} gene was found to be the most prevalent, followed by $bla_{Oxa\text{-}48\text{-}like}$ genes among the pediatric population. Moreover, the rates of CR *Klebsiella* spp were increased from 28% in 2010 to 33% in 2015 (Figure 1). This issue was addressed in our previous study where 22% of the *Klebsiella* spp exhibited resistance to carbapenems [2]. In recent years,

Figure 1. Trend line analysis of carbapenem resistant *Klebsiella* spp between 2010 and 2015.



similar observations were noted in various studies, this includes a retrospective analysis by Datta *et al*.,where inover ten years they had found that carbapenem resistance has increased from 2.1% in 2002 to 52% in 2009 in *Klebsiella* spp[3]; Gupta *et al.,* have reported 7% of carbapenem resistance in *Klebsiella* spp and 4% in *Escherichia coli* [4]; Datta *et al.,* have reported 12% resistance rates in *Klebsiella* spp and 3.5 % in *E.coli* [5]; Porwal *et al.,* reported 44% of CR *Klebsiella* spp among the ICU patients, indicating the risk for high mortality rates [6]. Remarkably, in our experience, among the ESKAPE pathogens, the rate of carbapenem resistance is rapidly rising in *Klebsiella* spp. To conclude, it is important to monitor the changes in the trends, burden and the outcome of carbapenemase producing *Klebsiella* spp in India among the pediatric group, to help in guiding effective empirical therapy

References

1. Shalini A, Suganya D, Radha G, Yamuna Devi B, Balaji V (2015) Rapid Screening for carbapenem resistant organisms: current results and future approaches. J Clin Diag Res 9: 1-3.
2. Rose W, Veeraraghavan B, Pragasam AK, Verghese VP (2014) Antimicrobial susceptibility profile of isolates from pediatric blood stream infections. Ind J Pediatrics 51: 752-753.
3. Datta S, Wattal C, Goel N, Oberoi JK, Raveendran R, Prasad KJ (2012) A ten year analysis of multi drug resistant blood stream infections caused by *Escherichia coli* & *Klebsiella pneumoniae* in a tertiary care hospital. Indian J Med Res 135: 907-922.
4. Gupta E, Mohanty S, Sood S, Dhawan B, Das BK, Kapil A (2006) Emerging resistance to carbapenems in a tertiary care hospital in north India. Indian J Med Res 124: 95-98
5. Datta P, Gupta V, Garg S, Chander J (2012) Phenotypic method for differentiation of carbapenemases in Enterobacteriaceae: Study from north India. Ind J Pathol Microbiol 55: 357-360.
6. Porwal R, Gopalakrishnan R, Rajesg NJ, Ramasubramanian V (2014) Carbapenem resistant Gram-negative bacteremia in an Indian Intensive care unit: A review of the clinical profile and treatment outcome of 50 patients. Ind J Critical Care Med 18: 750-753.

Corresponding author

Dr. Balaji Veeraraghavan
Professor and Head
Department of Clinical Microbiology,
Christian Medical College,
Ida Scudder Road,
Vellore – 632 004
Tamil Nadu, India
Phone: +91 9159110555
Fax: 91 (0) 416 - 2232103
Email: vbalaji@cmcvellore.ac.in

Conflict of interests: No conflict of interests is declared.