Emergence of *Aeromonas* spp. Harboring Multiple Carbapenemase-encoding Genes from Hospital Sewage

Sir,

In January 2016 issue of the journal, an excellent review on *Aeromonas* spp.\(^1\) as an emerging pathogen has been published emphasizing the importance of this enteric pathogen. We have also recently experienced the increasing prevalence of this organism in our hospital environment. A study was carried out to determine the prevalence of various enteric pathogens in hospital sewage of a tertiary care center in Varanasi, North India. Samples from 22 different sites were collected as previously described,\(^2\) and sewage samples were processed by membrane filtration method. Colonies of *Aeromonas* spp. were isolated on MacConkey agar and isolates were biochemically identified\(^2\) and type species were confirmed by 16sRNA-based polymerase chain reaction (PCR) and sequencing. Antimicrobial susceptibility testing was performed as per the Clinical and Laboratory Standards Institute\(^3\) and isolates were screened for the presence of carbapenemase genes by PCR (\(\text{bla}_{\text{GES}}, \text{bla}_{\text{IMI}}\text{/NMC-A}, \text{bla}_{\text{SME}}, \text{bla}_{\text{KPC}}, \text{bla}_{\text{IMP}}, \text{bla}_{\text{VIM}}, \text{bla}_{\text{OXA-48}}, \text{bla}_{\text{NDM}}\)^4).

A total of seven *Aeromonas* isolates were identified from seven different sites comprising four isolates of *Aeromonas caviae* and three isolates of *Aeromonas hydrophila*. The antimicrobial resistance profile of the isolates was 28.57% resistance to cefuroxime, 28.57% to ceftriaxone, 28.57% to cefepime, and 42.85% to levofloxacin. All except one (No.A) isolate were susceptible to carbapenems, namely, imipenem and meropenem by disc diffusion method. However, this isolate No.A harbored the \(\text{bla}_{\text{NDM}}\text{-1} \) and \(\text{bla}_{\text{OXA-48}}\) along with \(\text{bla}_{\text{GES}}\) carbapenemase genes [Figure 1].

It has been stated that the carriage rate of *Aeromonas* in human gut varies from 0% to 4%\(^1\). However, their increased isolation in hospital effluents which provides an excellent media for genetic exchange, being enriched with selective antibiotic pressure, is a threat to their emergence as virulent enteric pathogens. A few reports of *bla*\(_{\text{KPC}}\)-positive *Aeromonas* carriage in stool have been recently reported.\(^5,6\) In this case, isolate-harboring multiple carbapenemase-encoding genes simply accelerate the evolution of antimicrobial resistance in these pathogens.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**Tuhina Banerjee, Sourav Pal, Arghya Das**

Department of Microbiology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Address for correspondence:
Dr. Tuhina Banerjee,
E-mail: drtuhina@yahoo.com

**REFERENCES**

1. Batra P, Mathur P, Misra MC. *Aeromonas* spp.: An emerging nosocomial pathogen. J Lab Physicians 2016;8:1-4.
2. Monfort P, Baleux B. Distribution and survival of motile *Aeromonas* spp. in brackish water receiving sewage treatment effluent. Appl Environ Microbiol 1991;57:2459-67.
3. Clinical and Laboratory Standards Institute (CLSI). Methods for Antimicrobial Dilution and Disk Susceptibility Testing of Infrequently Isolated or Fastidious Bacteria; Approved Guideline. M45-A2. 2nd ed. Clinical and Laboratory Standards Institute; Wayne, PA: 2010.
4. Poirel L, Walsh TR, Cuvillier V, Nordmann P. Multiplex PCR for detection of acquired carbapenemase genes. Diagn Microbiol Infect Dis 2011;70:119-23.
5. Picão RC, Cardoso JP, Campana EH, Nicoletti AG, Petrolini FV,
Letters to Editor

Banerjee T, Pal S, Das A. Emergence of isolates. Previous investigations have shown that among the tube coagulase-negative staphylococci (CoNS), Staphylococcus aureus produces yellow colonies on mannitol-salt agar (MSA) due to the high salt content which inhibits the growth of other staphylococci. However, some CoNS can also produce yellow colonies on MSA. The growth and production of yellow colonies due to the high salt content of MSA is regarded as a characteristic for the differentiation of S. aureus from the other staphylococci. In our study, a total of 410 isolates of Gram-positive, mannitol-fermenting and coagulase-negative staphylococci (CoNS) were studied for their ability to produce yellow colonies on MSA. Of the 49 MSA-positive strains which were also tube coagulase-negative, 47% of the isolates were S. aureus, 28.5% were S. xylosus, and 20.4% were S. simulans, followed by S. warneri (26.5%) and 26.5% were S. haemolyticus. In our study, the isolation rate of S. aureus in the anterior nares, throat, and soft tissue, where the isolates were taken from blood, was 40–50% of the mannitol salt-positive isolates. The growth and production of yellow colonies due to the high salt content of MSA is regarded as a characteristic for the differentiation of S. aureus from the other staphylococci. The growth and production of yellow colonies due to the high salt content of MSA is regarded as a characteristic for the differentiation of S. aureus from the other staphylococci.

Access this article online
Quick Response Code:
Website: www.jlponline.org
DOI: 10.4103/0974-2727.187924

How to cite this article: Banerjee T, Pal S, Das A. Emergence of S. aureus species is high, whereas S. warneri is low. These findings highlight the importance of using MSA for the identification of S. aureus isolates and the need for further studies to understand the factors influencing the growth and production of yellow colonies on MSA.

Assis DM, et al. The route of antimicrobial resistance from the hospital effluent to the environment: Focus on the occurrence of KPC-producing Aeromonas spp. and Enterobacteriaceae in sewage. Diagn Microbiol Infect Dis 2013;76:80-5.

6. Hughes HY, Michelin AV, Lau AF, Dekker J, Frank K, Conlan S, et al. Detection of carbapenemase-producing Aeromonas hydrophila on perirectal surveillance culture. Open Forum Infect Dis 2014;1 Suppl 1:S134.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.