

TITLE: Presence of *bla*_{NDM-1} in *Stenotrophomonas maltophilia* isolated from Brazilian soil

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ABSTRACT:

The main mechanism of resistance to β -lactams antibiotics is the production of β -lactamases, which generates their hydrolysis and, consequently, the loss of the antimicrobial effect against bacteria. New Delhi Metallo- β -Lactamase (NDM) is one of the most important and worrying of these enzymes due to its wide spectrum of action on β -lactam antibiotics, except for aztreonam. NDM has been extensively researched and, although it is mostly described in clinical isolates, it has also been reported in bacteria isolated from soil and water. The great majority of NDM-producing bacteria belong to the *Enterobacteriaceae* family, but there are reports in Nonfermenting Gram-Negative Bacilli. This study aimed to investigate the presence of *bla*_{NDM} gene in isolates obtained from Brazilian soils. Soil samples were collected from different plantation areas from the five Brazilian regions. Isolation of bacteria from these samples was carried out and Genomic and plasmid DNA were extracted. Identification was performed using the 16S rRNA and 23S rRNA. The *bla*_{NDM} gene was screened by PCR using specific primer and plasmids were screened by PCR-based replicon typing. The *bla*_{NDM-1} gene was detected in an isolate of *Stenotrophomonas maltophilia* named S431, into an IncA/C plasmid. *S. maltophilia* is an opportunistic pathogen which has received increasing attention from researchers due to its high level of intrinsic resistance to different classes of antibiotics, adaptation to various environments and ability to form biofilm. The *bla*_{NDM} gene has already been detected in different plasmids, however IncA/C-type is one of the most prevalent. The first report of NDM-producing bacteria was in 2009 in a patient from India with a urinary tract infection caused by *Klebsiella pneumoniae*. After four years, in South America, the first report of *bla*_{NDM} was in Uruguay in a *Providencia rettgeri* isolate. In Brazil, the first report was also in *P. rettgeri* in 2013 and other reports were later described in bacteria belonging to the *Enterobacteriaceae* family, including the genera *Enterobacter*, *Escherichia*, *Morganella*, *Klebsiella*, *Providencia* and also in Nonfermenting Gram-Negative Bacilli, such as the genus *Acinetobacter*. The great majority of reports in Brazil were in the South and Southeast regions and in clinical bacterial isolates, with the exception of a *K. pneumoniae* isolated from a superficial beach water in Rio de Janeiro. By our knowledge, there is only one study reporting NDM-producing *Acinetobacter calcoaceticus* and *Acinetobacter junii* in livestock soil samples from China. This is a second report in the world and the first in Brazil of the NDM-producing bacteria isolated from soil.

Keywords: NDM, soil, *Stenotrophomonas maltophilia*

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