Rifampicin resistance among multi-resistant MRSA clinical isolates from Chennai, India, and their molecular characterization

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Received March 26, 2014
Accepted November 11, 2014
Published March 31, 2015
DOI http://dx.doi.org/10.4238/2015.March.31.1

ABSTRACT. High-level methicillin-resistant *Staphylococcus aureus* (MRSA) isolates show rapid evolution of rifampicin resistance, forcing reliance upon expensive and often inferior antibiotics to manage these infections. Accordingly, this study was conducted to: 1) evaluate the level of multidrug resistance among hospital-associated MRSA isolates from Chennai, India; 2) determine their rifampicin resistance and molecular characterization; and 3) analyze the identified *rpoB* gene mutations for predominant high-level rifampicin resistance-associated nucleotide changes. Conventional laboratory techniques and antibiogram evaluation by disc diffusion were utilized for isolate phenotypic identification. Among the 54 isolates obtained, 74% (42) were found to be MRSA. All the isolates exhibited complete susceptibility to linezolid and vancomycin, and variable resistance to conventional antibiotics; the MAR index value calculated was 0.64. Genotypic identification of the high-level rifampicin-resistant isolate *S. aureus* KM05 was established through *rpoB* amplification and
sequencing. The evolutionary relationship of KM05 to other isolates and its \textit{rpoB} gene mutation status was determined to understand the genetic basis of its high rifampicin resistance. The \textit{S. aureus} KM05 \textit{rpoB} gene yielded \( \geq 98\% \) sequence similarity and a close phylogenetic relationship with other known reference database organisms. It also showed mutational changes in three \textit{rpoB} codon positions encoding amino acids at positions 455, 481, and 529. These results have established the prevalence of rifampicin resistance among Chennai hospital MRSA isolates, and suggest that the predominant high-level resistance nucleotide changes would serve to form a basis for their diagnosis and control of rifampicin-resistant MRSA.

\textbf{Key words:} Genotype; MRSA; Rifampicin; \textit{rpoB}; \textit{Staphylococcus aureus}