Phenotypic Differentiation of BORSA from MRSA: Comparison of Susceptibility testing methods and MRSA Latex Agglutination Test

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Introduction

Staphylococcus aureus is one of the most common causes of nosocomial or community-based infections that were resistant to â-lactam antibiotics due to production of ß-lactamase and presence of mecA gene. Most laboratories use disk diffusion method and MIC for detection of methicillin resistance in S. aureus. The latex agglutination test is an alternative to PCR for rapid detection of mecA gene. The aim of the study is to detect and differentiate BORSA (Borderline Oxacillin Resistant Staphylococcus aureus) from MRSA (Methicillin Resistant Staphylococcus aureus) and to compare MRSA latex agglutination test with standard susceptibility testing methods viz., oxacillin agar screen, Cefoxitin disc diffusion test and MIC.

Materials and methods

After obtaining approval from Institutional Scientific and Ethics Committee, clinical samples were processed over a period of two months at Tirunelveli Medical College Hospital by following the standard protocols. Resistant strains of S. aureus were subjected to the following phenotypic methods to screen and confirm MRSA viz., Oxacillin screen agar and Cefoxitin disc diffusion test and also were tested for detection and differentiation of BORSA from MRSA by Minimum inhibitory concentration (MIC) of Oxacillin by Broth Macrodilution method.PBP 2a encoded mecA gene was detected by rapid MRSA Latex Agglutination Test (Slidex MRSA Detection kit,Biomeriux,France).

Results

Nineteen strains were classified as borderline according to oxacillin MIC, resistant by oxacillin disk and sensitive to Cefoxitin and 33 strains were classified as MRSA resistant by oxacillin and Cefoxitin disk methods. The three strains that were classified as resistant by the oxacillin disk and Broth macrodilution methods were also resistant by the oxacillin agar screening agar whereas sixteen strains were susceptible. The sensitivity and specificity of the oxacillin agar screen test were 81.81 and 84.21%, respectively(Table-1) MRSA-Screen detects the PBP2a antigen in all 33 MRSA strains and all 19 BORSA strains were mecA negative. The sensitivity, specificity, PPV and NPV are 100%(Table-2)The MRSA latex agglutination test is also correlated with the cefoxitin disc diffusion test and the oxacillin MIC for detection of MRSA.

Conclusion

In summary, compared to PCR as the "gold standard," the MRSA-Screen latex agglutination test is able to rapidly and accurately determine the presence of oxacillin resistance mediated by the mecA gene.

Keywords: Borderline Oxacillin Resistant Staphylococcus aureus (BORSA), Methicillin Resistant Staphylococcus aureus (MRSA), Oxacillin agar screen, Cefoxitin disc diffusion test, MIC, MRSA Latex Agglutination Test.