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Comparison of different methods for coagulase production by staphylococci

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Abstract

Aim: To compare different methods for detection of Coagulase production by *Staphylococcus aureus*.

Material and methods: Total 76 species of Staphylococci were isolated from 1083 clinical specimens. Coagulase tests were performed using five different methods including Slide Coagulase test, Tube Coagulase test with diluted human plasma (I), undiluted human plasma (II) and Brain heart infusion (BHI) broth with undiluted human plasma (III) and Coagulase mannitol agar plate method as per standard methods.

Results: In Slide Coagulase test, 43 (86%) out of 50 strains gave positive results. In all the three methods of Tube Coagulase test, 50 (100%) out of 50 strains gave positive results. In Coagulase mannitol agar plate method, 48 (96%) out of 50 strains produced opaque zones which indicated coagulase production.

Conclusion: This study shows that, in all the five different methods, all three Tube methods gave 100% positive results. Slide coagulase test gave 43 (86%) out of 50 positive results.

Keywords: Slide Coagulase test, *Staphylococcus aureus*, Tube Coagulase test

Introduction

Staphylococcus aureus is one of the most commonly encountered pathogen in clinical specimens. The major habitats of the pathogen are the nasal membrane and skin ^[1]. It is a major cause of community-acquired and hospital-acquired infections.

To make the distinction between this species and other less virulent Staphylococci, it is of importance to have a reliable, fast, and simple identification test available ^[1]. Coagulase test is used specifically to differentiate *Staphylococcus aureus* from other species of *Staphylococcus*.

Materials and Methods

Total 76 species of Staphylococci were isolated from 1083 clinical specimens during the period of December'11 to April'12.

Strains were isolated on Nutrient agar and identification was done using Gram Stain, Catalase test and Slide and Tube Coagulase test.

Out of this, 50 Strains of Staphylococci, which were either slide or tube Coagulase test positive, were selected for study.

Coagulase tests were performed using five different methods including Slide Coagulase test, Tube Coagulase test with diluted human plasma(I), undiluted human plasma (II) and Brain heart infusion (BHI) broth with undiluted human plasma(III) and Coagulase mannitol agar plate method as per standard methods ^[2, 3].

Slide coagulase test was observed for immediate formation of clumps as shown in figure 1.

Tube coagulase tests were observed for formation of coagulum at 1 hour, 2 hours, 4 hours and 24 hours.

In coagulase mannitol agar plate method, strains were inoculated and incubated at 37 °C for 24 hours ^[2]; the growth was observed for opacity and surrounding yellow discoloration next day as shown in figure 6.

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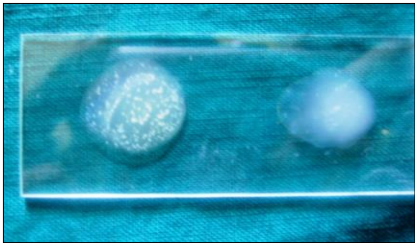


Fig 1: Slide Coagulation Test



Fig 2: Tube Coagulation Test

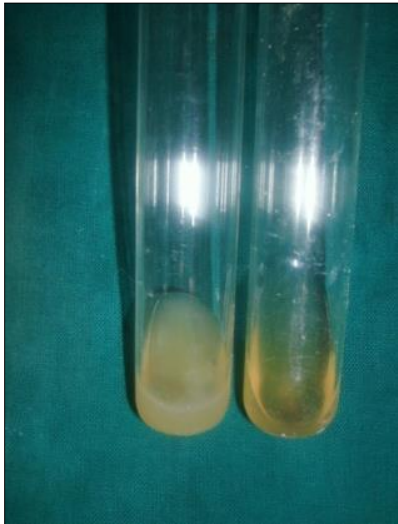


Fig 3: Tube Coagulation Test



Fig 4: Tube Coagulation Test



Fig 5: Coagulase mannitol agar plate method (Negative)

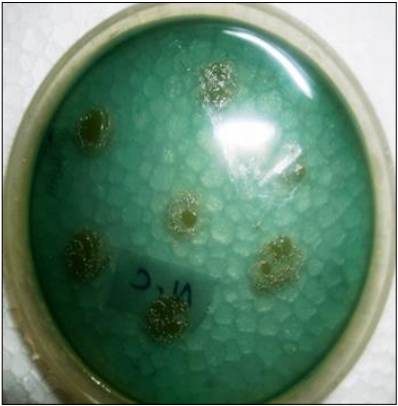


Fig 6: Coagulase mannitol agar plate method (Positive)

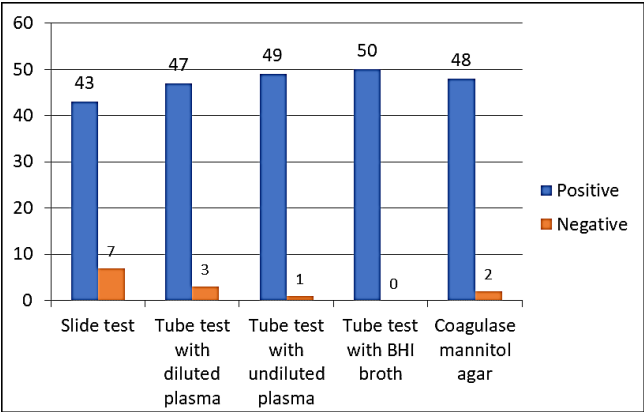


Fig 7: Comparison of different methods of coagulase test

Results and Discussion

In Slide coagulase test, 43 (86%) out of 50 strains gave positive results. In all the three methods of Tube Coagulase test, 50 (100%) out of 50 strains gave positive results. In Coagulase mannitol agar plate method, 48(96%) out of 50 strains produced opaque zones which indicated coagulase production. In Tube coagulase test I, 18 strains were positive at 1 hour, 10 at 2 hours, 09 at 4 hours and 10 at 24 hours. Positive results showed semisolid and small coagulum. In Tube coagulase test II, 26 strains were positive at 1 hour, 11 at 2 hours, 02 at 4 hours and 10 at 24 hours. Positive results showed firm, solid coagulum. In Tube coagulase test III, 25 strain was positive at 1 hour, 07 at 2 hours, 13 at 4 hours and 05 at 24 hours. Positive results showed firm, solid

coagulase test gave 86% positive result, while Luijendijk *et al.* ^[1]. Reported 98% positive results. Tube coagulase tests gave 100% positive results, while Luijendijk *et al.* ^[1] reported 99% and Sperber *et al.* ^[5] reported 86% positive results.

Conclusion

This study shows that, in all the five different methods, all three Tube methods gave 100% positive results. Slide coagulase test gave 43 (86%) out of 50 positive results. it can be used as screening method as it provides rapid results. In Tube methods, test with diluted and undiluted plasma gave positive results in short time period compare to tube test with BHI and undiluted plasma. In tube methods, test with diluted plasma gives small and semisolid clot formation, while firm clot formation occurs in test with undiluted plasma and test with BHI and undiluted plasma. Coagulase mannitol agar plate method is a simple method which provides clear results early with primary isolation, so it may be used as primary plating medium for certain clinical specimens like pus.

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