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Editorial

Role of Bacteria in Bloodstream Infections

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DESCRIPTION

Staphylococcus aureus and *S. epidermidis* are the most commonly isolated bacteria on human skin that also colonize the upper respiratory tract of humans. They are Gram-positive and appear as grape-like clusters under microscope. Both of *S. aureus* and *S. epidermidis* are normal flora of the human skin. They usually colonize and reside in or on part of human's body without causing any infection. However, it can be pathogenic and cause serious infection when present in large numbers. They can lead to Skin and Soft-Tissue Infection (SSTIs).

Previous studies have shown *S. aureus* to be the leading cause of bloodstream infections. Methicillin-resistant *Staphylococcus aureus* (MRSA) causes potential infections and tend to become multidrug-resistant organism to lactam drugs. It could be resistant towards other classes of antibiotics including lincosamides, aminoglycosides, macrolides, fluoroquinolones and tetracycline. Commonly, penicillin-binding protein (PBPs) is found in normal bacteria that had an ability to bind with penicillin. However, MRSA differ from normal *S. aureus* in the presence of altered PBPs which is known as Penicillin Binding Protein 2 (PBP2') or Penicillin-Binding Protein A (PBP2a) which prevents the binding of penicillin. MRSA has spread rapidly in the health care environment until today.

Abscesses, sore and boil on the skin will be the early symptoms of the mild-infection. Lack of proper sanitation and through contact with infected persons or objects can contribute to the infection. The first case of MRSA was discovered in 1961, during the introduction of methicillin in the United Kingdom. Isolates were resistant towards all types of lactam antibiotics. In common bacterial cell, Penicillin-Binding Protein 2 (PBPs) is a part of structure that serves to be the binding-site attachment for penicillin. However, production of foreign PBPs which is known as PBP2a or PBP2' in MRSA, lowers the affinity towards methicillin and other lactam antibiotics.

The presence of PBP2a is regulated by the expression of mecA gene. Two genes mecR1 and mecI control the expression of PBP2a within the mec region located upstream of the mecA gene. Hospital-Acquired MRSA (HA-MRSA) largely infects individuals with one or more comorbid condition or elderly patients. This will lead to possibilities of the patient developing pneumonia (infection of the lung passage), bacteremia (infection in bloodstream) or endocarditis (infection on the lining wall of the heart and valves). Surprisingly, community-acquired MRSA (CAMRSA) has disseminated rapidly since 2000s in adults and children in various region and countries. Phenotypic identification of *S. aureus* was confirmed by Bacti Staph Latex Agglutination Kit Test. It is a rapid test utilizing protein-coated latex particles which are capable of detecting both clumping factor and Protein A simultaneously. It is recommended to distinguished *S. aureus* from other species of *Staphylococci*. Aggregation of the smooth black latex suspension with the subsequent loss of black background visible to an unaided eye within 60 seconds, indicate positive result.

Positive and negative control was included in the test. Mueller Hinton-Agar (MHA) was used in AST in accordance to Clinical and Laboratory Standards Institute guidelines. In this test, Oxacillin (5 mg) and Cefoxitin (30 mg) disk diffusion were used to test the susceptibility of isolates towards antibiotic resistant. Tryptic Soy Broth (TSB) was used to culture the isolates after 6-8 hours of incubation at 37°C. MacFarland standard 0.5 was used to compare and adjust the turbidity of bacterial suspension to get the standard bacterial number for microbial testing.

This was done to avoid the suspension from being too heavy or too dilute which could lead to erroneous results. The culture was pipetted out and spread evenly in 3 different directions on Mueller-Hinton Agar (MHA) by using a sterile cotton swab. Antibiotic discs were gently placed on the MHA plate using a sterile syringe. Bunsen burner was used throughout the test to avoid any contamination. ATCC 33591 Methicillin-resistant *Staphylococcus aureus* and ATCC 33862 Methicillin-sensitive *Staphylococcus aureus* were used as positive and negative controls.

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