A Review on *Staphylococcus* sp. and its pathogens

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**ABSTRACT**
The genus *Staphylococcus* is an important microorganism because of its direct and dangerous impact on the lives of other organisms, and Alexander Ogaston was the first to release this designation in 1880 to denote spherical bacteria usually associated with pus in wound infections. The members of this species are found in various environments such as dust, water, air, feces, on the skin, and the mucous membranes of warm-blooded vertebrates, on clothing, and other places. Most species of this species live as natural flora on human skin and mucous membranes, but some are opportunistic pathogens. The species of *staphylococcus* is characterized by having several virulence factors that increase the efficacy and pathogenicity of its species on the occurrence of infection due to its possession of tequic acid and the adhesion factor and other factors that enable it to get rid of the host defenses as an enzyme (*Staphylokinase*) or enable it to invade and spread as an enzyme (*Hyaluronidase*). Its possession of cellular wall proteins, its formation of the capsule and the exogenous polysaccharides and its production of various types of extracellular enzymes and various toxins such as intestinal toxins fixed in the heat, secretion of immune system inhibitors and their containment of antibiotic resistance genes. It shows the total resistance to the degradation of lysozyme. *Staphylococcus aureus* is resistant to many antimicrobial agents and thus produces treatment problems. The sex of *staphylococcus* includes 36 species and 80 subtypes, where more is clarified from 20 types of *staphylococcus aureus*.

**INTRODUCTION**

*Staphylococcus* colonies are circular, thin, lustrous, white and sometimes yellow or orange colony diameter up to 3-2 mm. They grow naturally in many culture media. *Staphylococci* are classified depending on the production of coagulase coagulation (coagulate) into two main groups (Coagulase, that is, able to produce coagulation enzyme for blood plasma and the second group negative enzyme staphylococcus coagulate which is unable to produce coagulation enzyme for blood plasma (Moura et al., 2012). The developments in molecular biology and modern biotechnology enabled scientists and researchers to extract and separate the protein (Coagulate) and classify it from specialized enzymes and stimulated by the specific base material (Ryan and Ray, 2004), which is the prothrombin protein, transforming it into thrombin (Thrombin This interaction includes a complex formation (Staphylothrombin complex)) Thrombin is activated to interact with the transformation of fibrinogen into plasma blood in general into fibrin and a fine network of fibers responsible for thrombus formation (Murray et al., 2013;
The importance of the coagulase enzyme is that it encapsulates the cells of staphylococcus with fibrin, preventing the macrophages from eating them and Nak are two types of it restricted (Bound) and freewheeling (Free) (Geo et al., 2007; Amalraqibshamran et al., 2018).

**Coagulase-Negative Staphylococci**

Coagulase-Negative Staphylococci (CONS) is a natural streptococcus of human skin and mucous membranes of humans and some lactobacilli and birds (Asangi et al., 2011; Longauerova, 2006). It is considered an opportunistic bacterium that shows its pathogenic ability in patients with immunocompromised patients, chronic diseases and long-term patients in hospital (Jean-Baptiste et al., 2011), as it enters the bloodstream and causes injuries to the circulatory system, especially in cases associated with the use of some medical devices, such as catheter tubes and blood implants, for hospitalized patients (Al-Mazroea, 2009). It is considered one of the most important bacterial species that cause hospital-acquired infections (Nosocomial Infections), as it is characterized by its ability to grow in thermal ranges from 15-43 °C (Moura et al., 2012; Götz et al., 2006). It has a NaCl tolerance of 15% and is resistant to the minimum inhibitory concentrations of some common antiseptics as well as its multiple resistance to antibiotics. External intestinal causing food poisoning. Most resistance mechanisms in staphylococci encode plasmids, which provides an opportunity to transfer this resistance to other species and genera (Ternes et al., 2013; Türkyilmaz and Süheyla, 2006).

The ability of these species to coexist within hospitals enabled them to acquire resistance to many antibiotics, which reached 100% for β-lactam compounds and 80% for methylene, which sometimes exceeds the resistance of type S. aureus (Galdbart et al., 2000). There are numerous reports indicating the ability of the type S.epidermidis to injure the heart muscle Endocarditis, and the occurrence of infection in many cases associated with the use of medical therapeutic tools, especially catheter tubes, and the ability of this type to cause infections of the ears, burns and urinary tract. The danger of staphylococcus lies in its ability to coexist with other bacterial species and transfer plasmid resistance factors to it, thereby enhancing its epidemiological role within hospitals (Sousa et al., 2000).

**Staphylococcus lentus**

S.lentus bacteria is a CONS type that is widespread and widespread as it can be isolated from various environments such as soil, sand, and water, as well as hospitals, which are bacteria of animal origin that transmit to humans (Al-Grawi and Al-Awsi, 2018). Isolated from the skin for many types of ruminants, carnivores, rodents and birds, and from animal food products such as milk and people working in the fields with wild and domestic animals where they found carriers of these bacteria (Chalap and Al-Awsi, 2019), as isolated from Sheep, goats, raw milk, diuresis and larvae T fly home Musca domestica. The previous studies have shown resistance genes to antibiotics is limited mostly isolated from plasmid nurses and is one of the causes of infection of the udder in animals and, in rare cases, cause injury to humans. Although not very isolated from humans, they are associated with several injuries such as endocardial and peritoneal infection, urinary tract, pelvis and spleen abscesses Wound injuries (Ewaid and Abed, 2017; Ewaid et al., 2019a,b).

**Pathogenicity**

Class 14 is a type of human streptococcus (CONS) bacterium that is human-related. It is capable of infecting various body systems, from the skin to the heart and spinal cord, because it has many virulence factors and its high and multiple resistance to antibiotics and antiseptics as well as saline tolerance, that the symptoms caused by CONS are usually hidden and non-specific and the clinical stages of infection are in the subacute or chronic phase without apparent symptoms. CONS is active in cases of immunodeficiency and diseases Chronic diseases, especially among patients in the hospital, are elevated. It is a disease that causes it to enter the body, as it is one of the opportunistic pathogens. It has the ability to infect the female, urinary and reproductive system, and it infects the heart, bone, eyes, breasts, middle ear, wounds, burns, and participation in other infections (Bannerman, 2003).

Reports indicated high levels of CONS in blood infection, and studies have shown that some types of adhesion and polysaccharide component have the ability to adhere to the plastic medical number, especially the catheter tubes and the formation of a biofilm membrane known as Biofilm (Marraffini et al., 2006; Suleiman et al., 2013). Protecting the bacteria from the host’s defenses and preventing the access of the antibiotic to the bacteria. S. lentus is an opportunistic pathogen for immunocompromised patients. Therefore, its pathology is associated with severe human infections and causes various infections such as endocardial and peritoneal infection, urinary tract, pelvis, bone, spleen abscesses and wound injuries (Rohde et al., 2004).

**Antibiotics**

They are organic compounds produced by certain
types of microorganisms and can, with a few concentrations, inhibit the growth or kill of another microorganism, isolated from various biological sources such as fungi and bacteria, some of which are synthetic or semi-synthetic. Antagonists work with various mechanisms to influence or eliminate bacterial cells. Their effect is usually on building the cell wall and its membranes or affecting the manufacture of proteins or nuclear material RNA or DNA and they differ in terms of the mechanism of their action. The persistence of the antagonist will depend on the appropriate dose and the antibody permeability (Fagade et al., 2010).

**Bacterial resistant for antibiotics**

Since the discovery of an anti-penicillin, staphylococcus has shown high resistance to it and most antibiotics such as tetracycline, erythromycin, sulfa compounds, etc. The level of resistance to β-lactam antagonists has reached 100%, so there is a need to find other types of penicillin compounds such as Nafcillin and Methicillin. Streptococcal infection evolved into a major problem in hospitals, especially with the emergence of strains resistant to miscarriages. The high ability of staph to acquire resistance to antibiotics increases their disease and risk, especially in hospitals, and the large indiscriminate use of antibiotics helped the emergence of resistant bacterial strains (WHO, 2003). As staph is a natural flora of human skin and this makes it in constant exposure to all the antibiotics that the patient takes, which motivates them to show different resistance mechanisms (Chillab et al., 2019).

**Penicillins**

Penicillins were discovered by Alexander Fleming in 1929 when noting the inhibition in the growth of S. aureus bacteria farms after being contaminated with Penicillium notatum. Penicillins are a wide range of natural and semi-manufactured antibiotics. The anti-penicillin consists of the penicillic nucleus (6-amino penicillic acid) necessary for biological activity, which is a thiazolidine ring connected with the Lactam ring and connected to the nucleus, a side chain R-side chain) that has different roots. For penicillin derivatives. Staphylococcus for anti-beta-lactam antagonists works with one of two main resistance mechanisms. The first is the production of beta-lactamase or penicillinase enzymes as it breaks the beta-lactam ring with the hydrolysis that makes the penicillin molecule ineffective. Streptococcus beta-lactase enzymes are encoded by a plaZ gene carried on the plasmid (Malachowa and Deleo, 2010), and the second mechanism is staph resistance to methylin (metcillin) occurs when it acquires the mecA gene that encodes the same PBP2a-related proteins. The low familiarity with beta-lactam antidepressants (Han et al., 2013).

**Cephalosporins**

Cephalosporins are another group of beta-lactam antigens that are structurally and functionally similar to penicillins, their effectiveness against bacteria that are positive for a gram of color depends on the antihistamine effect of penicillin-sensitive enzymes PBPs. Broad-spectrum safe to use. It was first isolated from the farms of Cephalosporum acrimonum in 1948 and the modifications made to these compounds led to the development of beneficial and good antibiotics such as (Ibraheen et al., 2017). It contains a betamythium nucleus combined with a dihydrotiazine ring (Kadhim and Al-Zaidy, 2019; Abed, 2019).

**CONCLUSIONS**

Its possession of cellular wall proteins, its formation of the capsule and the exogenous polysaccharides and its production of various types of extra-cellular enzymes and various toxins such as intestinal toxins fixed in the heat, secretion of immune system inhibitors and their containment of antibiotic resistance genes. It shows the total resistance to the degradation of lysozyme. Staphylococcus aureus is resistant to many antimicrobial agents and thus produces treatment problems. The sex of staphylococcus includes 36 species and 80 subtypes, where more is clarified From 20 types of *staphylococcus aureus*.

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