

# Abstract

Conjunctival infections cause a worldwide problem and affects people of different ages. Proper treatment can reduce symptoms, recovery time, contagious spread, possible re-infection and risk of complications but prolonged use of antibiotics can cause resistance strains. Infections with MDROs can lead to inadequate or delayed antimicrobial therapy.

*Staphylococcus* spp. is a clinically relevant pathogen due to its antimicrobial resistance and evasion of the host immune system. Its virulence factors in avoiding host responses and influencing disease make them able to form biofilm. Emergence of resistant staphylococci from the conjunctiva is of great concern because its virulence is related to the clinical outcome of ocular infections like keratitis or endophthalmitis.

Biofilm forming multidrug resistant *Staphylococcus* spp. are major reservoirs for transmission of ophthalmic infections. Various extracellular substances enable bacteria to form biofilm. Production of these components is dependent on the presence of biofilm-essential genes such as the *ica* operon.

The aim of this study was to determine association of *ica A* with biofilm formation in staphylococci isolated from patients with conjunctivitis, determine association of *ica A* gene with antibiotic resistance profile in *Staphylococci* causing conjunctivitis.

Fifty subjects suffering from staphylococcal bacterial conjunctivitis were included in this study. Specimen collection was done followed by identification for bacterial identification, antibiotic sensitivity test was done for each isolate to detect proper antimicrobial treatment. Biofilm formation was detected by CRA and MTP (phenotypic detection). Conventional PCR technique was done to detect the presence of *ica A* gene and its relation to the biofilm.

Among the 50 patients; 30 *S. aureus* (60%) and 20 CoNS (40%) were isolated.

Detection of *S. aureus* biofilm by MTP showed 8 strong biofilm forming isolates (26.7%), 7 moderate (23.3%), 3 weak (10%) and 12 negative (40%). While detection of biofilm of *S. aureus* by CRA showed 7 Strong (23.3%), 8 moderate (26.7%), 3 Weak (10%) and 12 negative (40%). Detection of *ica A* gene in *S. aureus* was found in 18 biofilm producing isolates by phenotypic methods and was not found in 12 biofilm producing isolates.

**Keywords:** Association of Intercellular Adhesion Gene A (*ica A*) with Biofilm Formation in Staphylococci Isolated from Patients with Conjunctivitis

# **Association of Intercellular Adhesion Gene A (ica A) with Biofilm Formation in Staphylococci Isolated from Patients with Conjunctivitis**

## *Thesis*

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# Contents

	<i>Page No.</i>
<b>List of tables .....</b>	<b>I</b>
<b>List of figures .....</b>	<b>IV</b>
<b>List of abbreviations .....</b>	<b>VII</b>
<b>Abstract.....</b>	<b>XI</b>
<b>Introduction &amp; Aim of the work .....</b>	<b>1</b>
<b>Review of literature:</b>	
Conjunctivitis .....	5
Staphylococcus and biofilm .....	20
Intracellular adhesion gene .....	42
Staphylococcus and drug resistance.....	50
Therapeutic approaches of staphylococcal biofilm.....	58
Infection prevention and control .....	72
<b>Materials and Methods .....</b>	<b>77</b>
<b>Results .....</b>	<b>95</b>
<b>Discussion .....</b>	<b>110</b>
<b>Summary &amp; Conclusion .....</b>	<b>114</b>
<b>Recommendations .....</b>	<b>118</b>
<b>References .....</b>	<b>120</b>
<b>Arabic summary .....</b>	<b>١</b>

## List of Tables

<i>Table Number</i>	<i>Title</i>	<i>Page</i>
<b>Table (1)</b>	Antibiotics used for antibiotic susceptibility testing for staphylococcal species and their zones diameter breakpoints according to CLSI 2014	<b><u>81</u></b>
<b>Table (2)</b>	Frequencies (n) and percentages (%) of biofilm producing <i>S. aureus</i> by Congo red agar	<b><u>98</u></b>
<b>Table (3)</b>	Frequencies (n) and percentages (%) of biofilm producing in <i>S. aureus</i> by Microtitre plate	<b><u>98</u></b>
<b>Table (4)</b>	PCR results for <i>ica A</i> gene in <i>S. aureus</i>	<b><u>98</u></b>
<b>Table (5)</b>	Frequencies (n), percentages (%) and results of Wilcoxon signed rank test for association between MTP and CRA in detection of <i>S. aureus</i> biofilm	<b><u>99</u></b>
<b>Table (6)</b>	Frequencies (n), percentages (%) and results of Wilcoxon signed rank test for comparison between <i>ica A</i> gene presence and biofilm formation as detected by Microtitre plate in <i>S. aureus</i> microorganism	<b><u>96</u></b>
<b>Table (7)</b>	Frequencies (n), percentages (%) and results of Wilcoxon signed rank test for comparison between <i>ica A</i> gene presence and biofilm formation as detected by CRA in <i>S. aureus</i> microorganism	<b><u>101</u></b>

<i>Table Number</i>	<i>Title</i>	<i>Page</i>
<b>Table (8)</b>	Frequencies (n) and percentages (%) of biofilm production in CoNS by Congo red agar	<b><u>102</u></b>
<b>Table (9)</b>	Frequencies (n) and percentages (%) of of biofilm production in CoNS by Microtitre plate	<b><u>102</u></b>
<b>Table (10)</b>	Frequencies (n) and percentages (%) of CoNS by PCR	<b><u>102</u></b>
<b>Table (11)</b>	Frequencies (n), percentages (%) for association between MTP and CRA in detection of biofilm formation of CoNS	<b><u>103</u></b>
<b>Table (12)</b>	Frequencies (n), percentages (%) and results of Wilcoxon signed rank test for comparison between <i>ica A</i> gene presence and biofilm formation as detected by Microtitre plate in CoNS	<b><u>104</u></b>
<b>Table (13)</b>	Frequencies (n), percentages (%) and results of Wilcoxon signed rank test for association between <i>ica A</i> gene presence and biofilm formation as detected by Congo red method in CoNS	<b><u>105</u></b>
<b>Table (14)</b>	Frequencies (n) and percentages (%) of sensitivity and resistance of <i>S. aureus</i> to different antibiotics	<b><u>106</u></b>

<i>Table Number</i>	<i>Title</i>	<i>Page</i>
<b>Table (15)</b>	Frequencies (n), percentages (%) and results of Wilcoxon signed rank test for the association between <i>ica A</i> gene and MDR in <i>S. aureus</i>	<b><u>107</u></b>
<b>Table (16)</b>	Frequencies (n) and percentages (%) of sensitivity and resistance of CoNS to different antibiotics	<b><u>108</u></b>
<b>Table (17)</b>	Frequencies (n), percentages (%) and results of Wilcoxon signed rank test for the association between <i>ica A</i> gene and MDR in CoNS microorganism	<b><u>109</u></b>

## List of Figures

<i>Figure Number</i>	<i>Title</i>	<i>Page No.</i>
<b>Figure (1)</b>	Conjunctivitis	<u>5</u>
<b>Figure (2)</b>	Viral conjunctivitis purulent discharge	<u>8</u>
<b>Figure (3)</b>	Chlamydial Conjunctivitis	<u>10</u>
<b>Figure (4)</b>	Pathogenic factors of <i>S. aureus</i> , with structural and secreted products both playing roles as virulence factors. <i>A</i> : Surface and secreted proteins. <i>B</i> and <i>C</i> : Cross sections of the cell wall	<u>13</u>
<b>Figure (5)</b>	Different phases of biofilm formation	<u>27</u>
<b>Figure (6)</b>	Mature biofilm	<u>28</u>
<b>Figure (7)</b>	Mechanism of quorum sensing	<u>37</u>
<b>Figure (8)</b>	Role of quorum sensing in biofilm: QS is involved in regulating different steps of biofilm development, including attachment, maturation and dispersal of biofilm	<u>37</u>
<b>Figure (9)</b>	Model of ica dependent (a) and ica independent (b) biofilm mechanisms in staphylococci	<u>44</u>

<i>Figure Number</i>	<i>Title</i>	<i>Page No.</i>
<b>Figure (10)</b>	A plate of blood agar medium cultured with an isolate showing complete hemolysis	<b><u>81</u></b>
<b>Figure (11)</b>	Congo red agar showing biofilm production and non biofilm production	<b><u>84</u></b>
<b>Figure (12a)</b>	Strong biofilm CRA	<b><u>84</u></b>
<b>Figure (12b)</b>	Intermediate biofilm CRA	<b><u>84</u></b>
<b>Figure (12c)</b>	Weak biofilm CRA	<b><u>84</u></b>
<b>Figure (13)</b>	MTP with different degrees of biofilm formation	<b><u>88</u></b>
<b>Figure (14)</b>	PCR reading by UV light gel documentation system	<b><u>93</u></b>
<b>Figure (15)</b>	Showing <i>S. aureus</i> and CoNS percentage	<b><u>95</u></b>
<b>Figure (16)</b>	A cultured plate of blood agar medium showing complete hemolysis of <i>S. aureus</i>	<b><u>96</u></b>
<b>Figure (17)</b>	Mannitol salt agar showing yellow colonies indicating <i>S. aureus</i>	<b><u>96</u></b>
<b>Figure (18)</b>	Catalase test showing a positive <i>Staphylococcus</i> colony	<b><u>97</u></b>
<b>Figure (19)</b>	Dry spot stapytect plus test showing agglutination in the indicates a positive test for <i>S. aureus</i>	<b><u>97</u></b>

<i>Figure Number</i>	<i>Title</i>	<i>Page No.</i>
<b>Figure (20)</b>	Bar chart representing association between findings of <i>S. aureus</i> biofilm by MTP & CRA	<b><u>99</u></b>
<b>Figure (21)</b>	Bar chart representing association between presence of <i>ica A</i> gene and biofilm formation as detected by MTP	<b><u>100</u></b>
<b>Figure (22)</b>	Bar chart representing association between presence of <i>ica A</i> gene and biofilm formation in <i>S.aureus</i> as detected by Congo Red method	<b><u>101</u></b>
<b>Figure (23)</b>	Bar chart representing association between findings of CoNS by MTP and CRA	<b><u>103</u></b>
<b>Figure (24)</b>	Bar chart representing association between presence of <i>ica A</i> gene and biofilm formation as detected by MTP	<b><u>104</u></b>
<b>Figure (25)</b>	Bar chart representing association between presence of <i>ica A</i> gene and biofilm formation in CoNS as detected by Congo red agar	<b><u>105</u></b>
<b>Figure (26)</b>	Bar chart representing association between findings of <i>ica A</i> gene presence and MDR for <i>S.aureus</i>	<b><u>107</u></b>
<b>Figure (27)</b>	Bar chart representing association between findings of <i>ica A</i> gene presence and MDR for CoNS	<b><u>109</u></b>

## **List of Abbreviations**

<b>Aap</b>	Associated accumulation protein
<b>Agr</b>	Accessory gene regulatory
<b>AHL</b>	Acylated homoserine lactone
<b>AI</b>	Auto Inducer
<b>AIP</b>	Auto inducing cyclic thiolactone peptides
<b>AK</b>	Amikacin
<b>AMP</b>	Ampicillin
<b>AMR</b>	Antimicrobial resistance
<b>AMX</b>	Amoxicillin
<b>Bap</b>	Biofilm associated protein
<b>BHI</b>	Brain heart infusion agar
<b>CDC</b>	Centers for Disease Control and Prevention
<b>clfB</b>	Clumping factor B
<b>CLSI</b>	Clinical and laboratory standards institute
<b>CN</b>	Gentamycin
<b>CoNS</b>	Coagulase negative staphylococci
<b>CP</b>	Capsular polysaccharide
<b>C/P</b>	Ciprofloxacin
<b>CRA</b>	Congo Red Agar
<b>CRO</b>	Ceftraixone
<b>DA</b>	Clindamycin
<b>DNase</b>	Deoxyribonuclease

<b>Dpnag</b>	De poly-N-acetylated glucosamine
<b>Edna</b>	Extracellular Deoxyribonucleic acid
<b>DspB</b>	Dispersin B
<b>E</b>	Erythromycin
<b>ECDC</b>	European Centre for Disease Prevention and Control
<b>EPS</b>	Extracellular polymeric substances
<b>FnBP</b>	Fibronectin binding protein
<b>FOX</b>	Cefoxitin
<b>HIV</b>	Human immunodeficiency virus
<b>HSV</b>	Herpes simplex virus
<b>Ica</b>	Intracellular adhesion gene
<b>IL</b>	Interleukin
<b>IOL</b>	Intraocular lenses
<b>LZD</b>	Linezolid
<b>LPS</b>	Lipopolysaccharides
<b>M.B.E.C</b>	Minimum biofilm eradication concentration
<b>MHA</b>	Muller Hinton agar
<b>MRSA</b>	Methicillin resistant <i>S. aureus</i>
<b>MSCRAMM</b>	Microbial Surface Components Recognizing Adhesive Matrix Molecules
<b>MSSA</b>	Methicillin sensitive <i>S. aureus</i>
<b>MTP</b>	MicroTitre plate

<b>N. gonorrhoeae</b>	<i>Neisseria gonorrhoeae</i>
<b>OD</b>	Optical density
<b>ODc</b>	Cut-off value
<b>OPD</b>	Ophthalmology outpatient department
<b>P</b>	Penicillin
<b>P. aeruginosa</b>	<i>Pseudomonas aeruginosa</i>
<b>PBP</b>	Penicillin binding protein
<b>PDR</b>	Pan drug resistant
<b>PIA</b>	Polysaccharide intercellular adhesin
<b>PNAG</b>	Poly N- acetylglucosamine
<b>PSM</b>	Phenol soluble modulins
<b>PVC</b>	Polyvinyl chloride
<b>QQ</b>	Quorum quenching
<b>QRDR</b>	Quinolone resistance determining region
<b>QS</b>	Quorum sensing
<b>RD</b>	Rifampicin
<b><i>S. aureus</i></b>	<i>Staphylococcus aureus</i>
<b><i>S. capitis</i></b>	<i>Staphylococcus capitis</i>
<b><i>S. caprae</i></b>	<i>Staphylococcus caprae</i>
<b><i>S. chromogenus</i></b>	<i>Staphylococcus chromogenes</i>
<b><i>S. epidermidis</i></b>	<i>Staphylococcus epidermidis</i>
<b><i>S. hominis</i></b>	<i>Staphylococcus hominis</i>
<b><i>S. hyicus</i></b>	<i>Staphylococcus hyicus</i>

<b><i>S. pneumoniae</i></b>	<i>Streptococcus pneumoniae</i>
<b><i>S. saprophyticus</i></b>	<i>Staphylococcus saprophyticus</i>
<b>SCCmec</b>	<i>Staphylococcal</i> cassette chromosome mec
<b>SCV</b>	Small colony variant
<b>SE</b>	<i>Staphylococcal</i> Enterotoxin
<b>TMP-SXT</b>	Trimethoprim Sulphamethoprim
<b>TSB</b>	Tryptic soy broth
<b>TSST</b>	Toxic Shock Syndrome Toxin
<b>VA</b>	Vancomycin
<b>VISA</b>	Vancomycin intermediate resistant <i>S. aureus</i>
<b>VKC</b>	Vernal keratoconjunctivitis
<b>VRSA</b>	Vancomycin drug resistance
<b>VZV</b>	Varicella Zoster virus
<b>XDR</b>	Extensively drug resistant