UNIVERSITI TEKNOLOGI MARA

GLYCOPROTEIN PROFILING OF *Staphylococcus epidermidis* AND ITS ROLE IN BIOFILM FORMATION AND ANTIBIOTIC RESISTANCE

NUR ALIA BINTI OTHMAN

MSc

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student	:	Nur Alia binti Othman
Student I.D. No.	:	2014625008
Programme	:	Master of Science (Applied Biology) – AS751
Faculty	:	Applied Sciences
Thesis Title	:	Glycoprotein profiling of Staphylococcus epidermidis and its role in biofilm formation and antibiotic resistance
Signature of Student	:	……
Date	:	November 2021

ABSTRACT

Staphylococcus epidermidis is the most frequently detected coagulase-negative staphylococcus (CoNS) that is commonly responsible for catheter-related and central nervous system (CNS) infections. It is an opportunistic pathogen capable of forming biofilm which contributes to device-related infections and resistance to antibiotics. The ability to form biofilm has been linked with glycoproteins in biofilm-producing bacteria. This study investigates the differential glycoprotein expression between the biofilm producer and nonbiofilm producer of *S. epidermidis* and also its involvement in enhancing antibiotic resistance of the biofilm. *S. epidermidis* strains were subjected to N- and O-glycosylation inhibition followed by physical characterisation by Field Emission Electron Scanning Microscopy (FESEM) and antibiotic resistance profiling. The absence of O-glycosylation ascertains with reduced biofilm production of ATCC35984 strain and biofilm thickness. Subsequently, treatment with vancomycin, rifampicin and tetracycline showed that the antibiotics were more effective against O-glycan deficient biofilm. Differential protein expression was observed in planktonic and biofilm cultures of both biofilm and nonbiofilm producing strains. Glycoproteins were detected using Pro-Q® Emerald 300 Glycoprotein staining and subjected to mass spectrometry (LC-MS) identification. Out of the 17 spots characterized, 55 glycoproteins were identified for glycoprotein site prediction as well as protein interaction analysis using STRING tool and Clusters of Orthologous Genes (COGs). Majority of these proteins were found to carry either N- or O-glycosylation sites with some known to be related with biofilm formation such as glutamate synthase and influence antibiotic resistance for example glutamate-tRNA ligase. Therefore, O-glycans are suggested to have potential impact on biofilm formation and antibiotic resistance of *S. epidermidis* which warrants further evaluation and validation.

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