UNIVERSITI TEKNOLOGI MARA

DETERMINATION OF PERCENTAGE OF *STAPHYLOCOCCUS AUREUS* WITH POSITIVE PVL ENCODING GENE AMONG PATIENTS AND NURSES IN HOSPITAL SUNGAI BULOH

SYAHIRAH BINTI SAMSUDIN

MSc

January 2020

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	: Syahirah Binti Samsudin
Student I.D. No.	: 2016140895
Programme	: Master of Science (Medicine) – MD780
Faculty	: Medicine
Thesis Title	: Determination of Percentage of *Staphylococcus aureus* with Positive PVL Encoding Gene among Patients and Nurses in Hospital Sungai Buloh
Signature of Student	: ……..
Date	: January 2020

ABSTRACT

Staphylococcus aureus (*S. aureus*) loading Panton-Valentine leukocidin (PVL) has developed a worldwide threat to public health. Recent reports showed significant increasing numbers of *S. aureus* infections caused by PVL-positive organisms worldwide which explains the need to carry out this study in Malaysia. The objective of this study was to determine the percentage of PVL-positive *S. aureus* among patients and nurses in Hospital Sungai Buloh. Collectively, 315 swabs were collected from the anterior nares of inpatients and nurses at three wards (surgical, medical and gynaecological) of Hospital Sungai Buloh. The isolates were identified and characterised using conventional and molecular methods. From 315 nasal samples collected, 50.8% (160/315) were *S. aureus* isolates. The percentage of *S. aureus* nasal carrier among nurses was 43.3% (13/30) while among patients was 51.6% (147/285). All the *S. aureus* isolates were susceptible to teicoplanin, tigecyline and vancomycin. About 68.1% (109/160) of the *S. aureus* isolates carried in the nasal cavity of the patients and nurses were methicillin-sensitive *S. aureus* (MSSA) and 31.9% (51/160) were methicillin-resistant *S. aureus* (MRSA). Out of the 160 *S. aureus* isolates, seven (4.4%) were found to be PVL-positive *S. aureus*. A significant difference ($\boldsymbol{P} < 0.05$) could be seen on the distribution of the PVL-positive *S. aureus* nasal carriers among different types of residence and monthly household income. The patients with a nasogastric intubation, fever past 2 weeks, runny nose, nose itching and longer hospital stay had a significantly high risk of being PVL nasal carriers. The phylogenetic analysis of all seven PVL isolates presented five patterns of isolates and they were distantly related. The finding of the percentage of PVL-positive *S. aureus* among patients and nurses will provide awareness to the hospital authority to take action for prevention and control.

ACKNOWLEDGEMENT

Firstly, I wish to thank Allah (SWT) for giving me the opportunity to embark on my MSc and for completing this challenging journey successfully. My gratitude and thanks go to my supervisor Dr. Hassanain Al-Talib and co-supervisor, Assoc. Prof. Dr. Zaini Mohd Zain for the support, patience and ideas in assisting me with this project. I also would like to express my gratitude to the staff of the Institute of Medical Molecular Biotechnology (IMMB) for providing the facilities, knowledge and assistance.

My appreciation goes to the management of UiTM Private Specialist Centre, Hospital Sungai Buloh and National Public Health Laboratory, Sungai Buloh who provided the facilities and assistance during sampling and running test. Special thanks to my colleagues and friends for helping me with this project, especially, Julia Ashazila Binti Mat Jusoh, Sakinah Binti Mohd Sofian, Siti Yatimah Binti Mohamad and Nur Syahida Binti Che Azaha.

Finally, I must express my very profound gratitude to my parents and my friends for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINERS	**ii**
AUTHOR'S DECLARATION	**iii**
ABSTRACT	**iv**
ACKNOWLEDGEMENT	**v**
TABLE OF CONTENTS	**vi**
LIST OF TABLES	**xi**
LIST OF FIGURES	**xii**
LIST OF SYMBOLS	**xiv**
LIST OF ABBREVIATIONS	**xv**
LIST OF NOMENCLATURES	**xvi**
CHAPTER ONE: INTRODUCTION	**1**
1.1 Research Background	1
1.2 Problem Statement	3
1.3 Research Objectives	4
1.4 Research Questions	4
1.5 Research Hypotheses	4
1.6 Significances of Study	5
1.7 Scope and Limitation of the Study	5
CHAPTER TWO: LITERATURE REVIEW	**6**
2.1 *Staphylococci spp.*	6
2.1.1 Coagulase-Positive Staphylococci	7
2.1.2 Coagulase-Negative Staphylococci	7
2.2 *Staphylococcus aureus*	7
2.2.1 Diseases caused by *S. aureus* Infection	8
2.2.2 Virulence Factors of *S. aureus*	9
2.2.2.1 Adhesion and Colonisation	10
2.2.2.2 Invasion	10