UNIVERSITI TEKNOLOGI MARA

ANTIBIOFILM ACTIVITIES OF COMPOUNDS FROM NATURAL SOURCES

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MSc

March 2021

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.

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ABSTRACT

In nature, some bacteria have the ability to produce biofilm which acts as a protective barrier against antibiotic killings. When bacteria produce biofilm, they are found to be more resistant against host defense mechanisms as compared to their planktonic counterparts, hence treating biofilm induced infections are known to be more a challenging task. Hence, research have focused on antibiofilm compounds instead as an alternative. The aim of this study was to screen for potential antibiofilm properties from natural sources which include actinomycetes, marine bacteria and frog's mucus secretion at three different stages of biofilm formation against biofilm producer *Staphylococcus epidermidis* ATCC 35984 while *S. epidermidis* ATCC 12228 served as a negative control. A total of 80 bioactive extracts from 40 actinomycetes isolates, 36 bioactive extracts from 18 marine bacterial isolates and nine lyophilized frog mucus secretions were screened for antibiofilm activities. While 31 actinomycetes and 14 marine bacterial isolates displayed very low antibiofilm activity with less than 5% inhibition, no antibiofilm activity was observed in majority of the isolates. In contrast, antibiofilm activities at various stages of biofilm formation was observed in all nine of the frog's mucus samples. Three samples namely RF1, RF2 and SF2 were able to inhibit the biofilm of *S. epidermidis* ATCC 35984 at all the three stages of biofilm formation. SF2 was found to display the highest antibiofilm activity at the attachment, maturation and dispersion stages with 97.84 %, 54.50 % and 11.17 % inhibition respectively. Molecular identification of SF2 showed that the nucleotide sequence of this frog was similar to the sequence of haplotype h11 16S ribosomal RNA gene of partial sequence mitochondrial of *Fejervarya cancrivora* at 100 % similarity. The lyophilized frog's mucus secretion of *F. cancrivora* was further fractionated, purified and sequenced to determine the compound responsible for its antibiofilm activities. Thirteen compounds were successfully fractionated. Compound F11 was found to be able to display a very high antibiofilm activity with 96.78% reduction of the biofilm formed by *S. epidermidis* ATCC35984. Peptide identification of F11 revealed that the major amino acid sequences, AAPNGLYFGG was found to be similar to the sequence of bacteriocin (Hypothetical protein M446_0103) from *Methylobacterium* species at 67 % similarity. This research shows that frogs mucus has a good potential as antibiofilm agent and should be further explored for their maximum capacity.

ACKNOWLEDGEMENT

Above all, I praised to Allah S.W.T. the Almighty Alhamdulillah for giving me the strength and opportunity to embark on my Master and for completing this long and challenging journey successfully. There are several individuals who have helped me in completing my Master research. I would like to express my deepest thanks to my supervisor, Dr Aziyah binti Abdul Aziz for giving me advices, knowledge, support and guidance throughout my journey to complete my study. I would also like to thank my co-supervisor, Prof. Madya Zainon binti Abdul Rahman for her guidance regarding this study. Special appreciation also goes to Prof. Dr. Mohd Faiz Foong Abdullah for giving the valuable information and suggestion regarding this Master research.

I would like to acknowledge the Universiti Teknologi MARA (UiTM) Shah Alam, especially Faculty of Applied Sciences for providing good facilities to conduct research. This gratitude also goes to all laboratory staffs of Microbiology and Biomolecular laboratory (A502), Postgraduate laboratory (A409) and Biochemistry laboratory (A610).

I am extremely grateful to my parents, Razali bin Abdul Razak and Hamidah binti Hamzah for their endless cooperation, encouragement, love and prayers. Finally, sincere thanks and appreciation go to my seniors and friends especially Syahmin, Alia, Ashraf, Farhan, Haifa and Aisyah for their friendship as well as suggestion for improvement regarding this study. To those who indirectly contributed in this research, your kindness means a lot to me.

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