

UNIVERSITI TEKNOLOGI MARA

DESIGN OF ORAL INTESTINAL-SPECIFIC ALGINATE-VITEXIN NANOPARTICULATE SYSTEM TO MODULATE BLOOD GLUCOSE LEVEL OF DIABETIC RATS

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MSc

August 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.

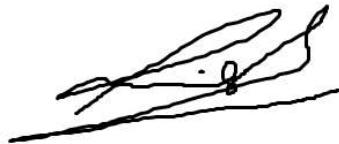
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ABSTRACT

Vitexin of *Ficus deltoidea* exhibits intestinal α -glucosidase inhibitory and blood glucose lowering effects. This study designs oral intestinal-specific alginate nanoparticulate system of vitexin. Nanospray-dried alginate, alginate/stearic acid and alginate-C18 conjugate nanoparticles were prepared. Stearic acid was adopted to hydrophobize the matrix and minimize premature vitexin release in stomach, whereas C-18 conjugate as immobilized fatty acid to sustain hydrophobic effect and drug release. Nanoparticles were compacted with polyethylene glycol (PEG 3000, 10000 and 20000). The physicochemical, drug release, *in vivo* blood glucose lowering and intestinal vitexin content of nanoparticles and compact were determined. Hydrophobization of alginate nanoparticles promoted premature vitexin release. Compaction of nanoparticles with PEG minimized vitexin release in the stomach, with stearic acid loaded nanoparticles exhibiting a higher vitexin release in the intestine. The introduction of stearic acid reduced vitexin-alginate interaction, conferred alginate-stearic acid mismatch, and dispersive stearic acid-induced particle breakdown with intestinal vitexin release. Use of PEG 10000 in compaction brought about PEG-nanoparticles interaction that negated initial vitexin release. The PEG dissolution in intestinal phase subsequently enabled particle breakdown and vitexin release. The PEG compacted nanoparticles exhibited oral intestinal-specific vitexin release, with positive blood glucose lowering and enhanced intestinal vitexin content *in vivo*.

ACKNOWLEDGEMENT

First, my deepest praise to Allah S.W.T. for giving me strength and opportunity to learn and complete my thesis and research. I humbly ask His forgiveness for any weaknesses throughout the learning process. May God forgive me.

I would like to express my sincere gratitude to my supervisor Prof. Dr. Wong Tin Wui, Non-Destructive Biomedical and Pharmaceutical Research Centre, Smart Manufacturing Research Institute, for his time, assistance and knowledge throughout the duration of my study. I also would like to express my gratitude to my co-supervisor Assoc. Prof. Dr. Choo Chee Yan for advising me with my project.

I thank my fellow laboratory mates in Non-Destructive Biomedical and Pharmaceutical Research Centre, iPROMISE for always discussing, guiding and helping me throughout the research till the end. I also would like to express my gratitude to Faculty of Pharmacy, UiTM for giving me the opportunity and facilities to carry out my research project.

Last but not least, special thanks to my beloved family especially my parents, Shaedi Abu Bakar and Normah Mad Noh for encouraging me to continue on this study. Not to forget, my beloved husband Mohamad Jazlan Mohamad Raffee for giving me moral support to complete my Master's study.

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