UNIVERSITI TEKNOLOGI MARA

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

NAFISHA BINTI SHAEDI

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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	:	Nafisha Binti Shaedi
Student I.D. No.	:	2013317443
Programme	:	Master of Science (Pharmaceutics) – PH764
Faculty	:	Pharmacy
Thesis Title	:	Design of Oral Intestinal-Specific Alginate-Vitexin Nanoparticulate System to Modulate Blood Glucose Level of Diabetic Rats

Signature of Student	:	……..
Date	:	August 2021

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*.

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