UNIVERSITI TEKNOLOGI MARA

SKIN HISTOLOGICAL EVALUATION OF TOPICALLY APPLIED MEDIUM CHAIN TRIACYLGLYCEROLS CREAM INCORPORATING α-TOCOPHEROL

MUIZZUDDIN BIN HADI

Dissertation submitted in partial fulfilment of the requirements

for the degree of

Bachelor of Pharmacy (Honours)

Faculty of Pharmacy

2014

ACKNOWLEDGEMENTS

Alhamdulillah, all praise to Allah S.W.T., the Most Merciful and the Most Gracious. With His help and guidance, I was able to finish this study successfully. First of all I would like to extend my thanks and gratitude to all the friends, lecturers and staffs and other parties that have been involved in the completion of this study.

My special thanks and gratitude to my supervisor Dr Salizatul Ilyana binti Ibrahim for her effort, support, and guidance of overseeing my progress until the completion of this study. Special thanks also to my co-supervisor Dr Nor Khaizan binti Anuar for providing excellent advice and assistance on technical matters.

I would like to extend my words of appreciation to all staffs in Biopharmaceutical and Pharmacokinetics Laboratory for their aiding and guidance. Last but not least, I would like to thank my family for their moral support and understanding throughout the duration of my study.

TABLE OF CONTENTS

ABSTRACT

Medium chain triacyglycerols (MCTs) have previously been used as carriers and enhancers as they work effectively in delivering the active into the skin. In this study, the permeation levels of MCTs, namely the virgin coconut oil (VCO) and structured virgin coconut oil (SVCO) were investigated based on the rat skin histology. The VCO was extracted by centrifugation method while SVCO was produced by acidolysis reaction using lipase as catalyst. The amount of 5% (w/w) α-tocopherol was used as the model antioxidant. The skin permeation procedure was carried out using the Franz diffusion cells. The MCTs creams were applied on the rat skin membrane for 6 hours at 37±2°C under stirring rate at 400 rpm. Then the skin was subjected to the staining procedure using Harris Haematoxylin-Eosin (H&E) stain kit and Oil Red O (ORO) stain kit for histological study. The result showed that accumulation of SVCO with significant amount in the deeper layer of dermis region suggested the better permeation ability as compared to the VCO. The SVCO that having shorter carbon chain lengths of triacylglycerols (TAGs) than the VCO appeared to influence its ability as the skin permeation enhancer of α-tocopherol. Both SVCO and VCO creams incorporating α-tocopherol showed higher amount of red spots distribution (skin stained with ORO) than the blank creams.

CHAPTER 1

INTRODUCTION

1.1 Research Background

Topical delivery system involved the delivery of drugs or actives through the skin via its application on the skin surface. The skin is the largest organ system of the body. It is made up of epidermis, dermis and hypodermis layers. The skin performs various functions including thermoregulation, vitamin D synthesis and also endocrine function. The most significant function of the skin is the biological barrier formed by the stratum corneum (SC) that brings a major problem in the topical delivery of active to pass through the skin. The SC is the outermost layer of the epidermis which composed of protein-fill corneocytes embedded in a lipid envelope, forming a brick and mortar structure. These features provide the main contribution to the skin biological barrier (Jepps *et al.*, 2013).