

**GELATIN CARRIER FOR METFORMIN DRUG**

**MUHAMMAD HISYAM BIN HASHIM**

**This report is submitted in partial fulfillment of the requirements  
needed for the award of Bachelor of Engineering (Hons) Chemical**

**FACULTY OF CHEMICAL ENGINEERING  
UNIVERSITI TEKNOLOGI MARA  
SHAH ALAM**

**JULY 2017**

## **ACKNOWLEDGEMENT**

It is indeed a great pleasure and privilege to present this report of my research thesis throughout two years of study on metformin drug carrier related field. I am extremely grateful to Allah, for bless on me that ease me doing my research study. I want to express my great appreciation to my wonderful parents for their love and continuous support throughout my 6 years of struggle at Faculty of Chemical Engineering UiTM. I will never truly able to express my sincere appreciation to the both of you. You've inspired me to continue to strive to be the best of myself every day. You have given the best support I could have asked for. I would like to express my gratitude to my supervisor, Dr Hazlina Husin, for her invaluable suggestions, motivation, guidance, and support throughout these two years of research. Her methodology, expertise, and skills inspire me to be as good as her in future. Thanks to all siblings, friends, supportive housemates, and to all those who guide me, taught me a lot, and accounted for their help in completing this thesis until it success. I extended my due thanks to all lecturers that delivers tonne of knowledge since my first year of study at Faculty of Chemical Engineering UiTM, Shah Alam and Pulau Pinang. They have gave me valuable time to spent at this faculty, give a lot of teachings, suggestions and guide me on understanding engineering aspects during this long years of study.

## **ABSTRACT**

During the past few decades there has been an increasing interest in the development of biodegradable micro/nanoparticles as drug delivery devices. Previous studies have reported that some existing additives are expensive and have poor degradability. The use of edible-based biodegradable additive remains attractive because of their abundance in nature and cost-effective. Biodegradable micro and nano-particulate additive is proposed. Selected local additive produced locally is incorporated with Metformin drug. Characterization, physical study and biological study was attempted, such as determination, morphological and rheological test, drug loading capabilities, biodegradation, toxicity and in vitro studies. The focus of the study is to create local biodegradable micro- and nano-sized particulate additive with Metformin loading formulation theory for drug delivery system. Apart from that, formulation theory created purposely aims to support the Malaysia's NKEA in healthcare so that local generic manufacturing for export can be increases.

## **TABLE OF CONTENTS**

	<b>PAGE</b>
<b>DECLARATION</b>	<b>i</b>
<b>CERTIFICATION</b>	<b>ii</b>
<b>ACKNOWLEDGEMENT</b>	<b>iv</b>
<b>ABSTRACT</b>	<b>v</b>
<b>TABLE OF CONTENTS</b>	<b>vi</b>
<b>LIST OF TABLES</b>	<b>ix</b>
<b>LIST OF FIGURES</b>	<b>x</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xii</b>
<b>LIST OF SYMBOLS</b>	<b>xiii</b>
<b>CHAPTER 1</b>	<b>INTRODUCTION</b>
1.1	Introduction 1
1.2	Research Background 2
1.3	Problem Statement 3
1.4	Objectives of Research 4
<b>CHAPTER 2</b>	<b>LITERATURE REVIEW</b>
2.1	Diabetes 5
2.2	Treatments Used in Diabetes 6
2.3	Metformin 7
2.4	Drug Delivery System 8
2.5	Dispersion System 10
2.6	Excipients 12
2.7	Agar 13
2.8	Gelatine 13

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

Diabetes among young children were almost unheard fifteen years ago. But recent study done on by Journal of the American Medical Association proved that there are about an increase to at least 3700 of diabetes type 2 cases among youth in the United States alone (Erika Gebel, 2017). This evidence urge doctors all around the world to find solution to solve this problem.

Researcher from Diabetes In Youth Organization, released statistical data that there was an increment by 21% on diabetic patient among children aged 10 to 19 years old within years 2001 until 2009. The data was not included young patient from Native Americans, Asian/Pacific and African American. Increment on Diabetes type 2 sufferers from young girl is more compared to boy sufferer. The diabetic patient number released, excluded patient age under 10, because it is difficult for people under age 10 are rarely suffer from diabetes type 2, but it is possible. People aged between 19 to 21 are favorably to get diabetes type 1. In addition, it is statistically proved that 1 in 3000 young people between age 10 to 19 suffer from diabetes type 2 and 6 case in 3000 people between age 1 to 19 is suffer from either diabetes type 1 or diabetes type 2. This number kept growing from years to years. Another shocking study done on African American shows that 40 percent of them suffer from type 1 diabetes, and 55 percent of them suffer from type 2 diabetes. While the remaining 5 percent are free from diabetes.

According to Jong Koi Chong, (2013), which is the president for Obesity Prevention Council, said that an alarming 3.6 million adults and children are estimated to be affected by diabetes in Malaysia and 3 million people in the UK have now been diagnosed with diabetes.