LITERATURE REVIEW ON HERBS THAT TREAT TYPE 2 DIABETES MELLITUS (T2DM)

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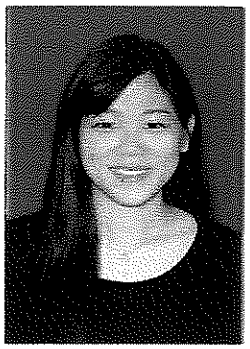
DECLARATION

I hereby declare that project report is based on my original work except quotations and citations which have been duly acknowledged. I also declare that it has not been preciously or concurrently submitted for any other degree at INTI International University or other institutions.



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ABSTRACT

Type 2 Diabetes Mellitus (formerly noninsulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes) is a metabolic disorder that is characterized by hyperglycemia (high blood sugar) in the context of insulin resistance, meaning the body doesn't react properly to insulin or their pancreas doesn't produce enough insulin to maintain a normal glucose level. This study is carried out to identify the herbs that can treat Type 2 Diabetes Mellitus. Numerous journals have been studied to discover herbs that are able to reduce blood glucose. The herbs that possess hypoglycemic effect are determined and the data are compiled and recorded. The herbs studied are proven through pharmacological experiments to have hypoglycemic effect. However, the mechanism of treating diabetes for some of the herbs is still unclear, thus related research remains to be further studied.

Key words: Type 2 Diabetes Mellitus, insulin, hypoglycemic, blood glucose

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LIST OF ABBREVIATIONS

TCM	Traditional Chinese Medicine
T2DM	Type 2 Diabetes Mellitus
FINS	Fasting Insulin
ISI	Insulin sensitivity index
FBG	Fasting Blood Glucose
SOD	Superoxide Dismutase
MDA	Malonaldehyde
c	Concentration
STZ	Streptozotocin

CHAPTER 1: INTRODUCTION

Type 2 Diabetes Mellitus (formerly noninsulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes) is a metabolic disorder that is characterized by hyperglycemia (high blood sugar) in the context of insulin resistance, meaning the body doesn't react properly to insulin or their pancreas doesn't produce enough insulin to maintain a normal glucose level.

Insulin is used by the body to manage glucose, or sugar, levels in the blood and to convert glucose into energy.

For some people, type 2 diabetes may be managed through diet and exercise. Other people may also need medicine to manage blood sugar.

The general objective of this thesis is to identify the herbs that can treat Type 2 Diabetes Mellitus.

The specific objectives are to study herbs that are able to increase insulin secretion, to explore herbs which can improve insulin resistance, to determine herbs that are able to reduce blood glucose levels, to investigate herbs that can increase glucose tolerance and to discover herbs that possess antioxidant effect.

CHAPTER 2: RESEARCH METHODOLOGY

All information and journals will be collected mostly from CNKI. These information includes the potential herbs that are able to reduce blood glucose levels, promote insulin secretion, and improve insulin resistance. Journals that contain a complete research protocol and an elaborate statistical results will be prioritized. I will then collect these data and compile them into a comprehensive list of herbs that can lower blood glucose. The data are collected from journals published between the year 1996 to 2015.

CHAPTER 3: RESULTS AND DISCUSSION

3.1 Raspberry 覆盆子

Results suggested that prolonged administration of raspberry ketone has a certain lowering effect on fasting blood glucose. Table 1.

Compared with the model group, the levels of FINS (fasting insulin) and ISI (Insulin sensitivity index) of the mice in raspberry ketone group was increased, indicating that raspberry ketone has the function of improving insulin secretion and insulin sensitivity index. Table 2.

Table 1. Effect of raspberry ketone on fasting blood glucose in alloxan-induced diabetic mice. n =12， x ± s

Groups	**Dose /mg·kg^{-1}**	**FBG/mmol·L^{-1}**		
		0 d	7 d	14 d
Normal		7.1 ±0.8	7.5 ±0.2	7.3 ±0.5
Model		16.1 ±3.4[1)]	23.2 ±5.7[2)]	34.3 ±6.4[2)]
Metformin	200	16.8 ±5.2[1)]	17.6 ±5.7[3)]	18.3 ±6.7[4)]
Raspberry ketone	200	15.8 ±6.4[1)]	23.3 ±7.1	32.4 ±8.2
	400	16.2 ±2.8[1)]	21.4 ±5.9	31.6 ±3.9
	800	16.2 ±5.4[1)]	18.2 ±2.3[3)]	24.2 ±5.4[4)]

Note: [1)] P <0. 05, [2)] P<0. 01, vs normal group; [3)] P<0. 05, [4)] P<0. 01, vs model group

Table 2. Effect of raspberry ketone on FINS and ISI in alloxan-induced diabetic mice.

n =12, x±s

Groups	Dose/mg·kg^{-1}	FINS/mU·L^{-1}	ISI
Normal		38. 31±2. 38	-3. 73±0. 64
Model		16. 91±3. 81[1)]	-6. 41±0. 21[1)]
Metformin	200	27. 13±5. 14[3)]	-4. 58±0. 32[3)]
Raspberry ketone	200	17.52±6.87	-6.19±0.13
	400	20.78±8.42[2)]	-5.84±0.87[2)]
	800	25.49±4.58[3)]	-4.87±0.54[3)]

Note: [1)] P <0. 01, vs normal group; [2)] P<0. 05, [3)] P<0. 01, vs model group

After administrating raspberry ketone, the symptoms of diabetic mice eased gradually; fasting blood glucose was significantly lowered, the insulin level in the blood increased, the body's insulin sensitivity index increased. It shows that raspberry ketone can improve insulin sensitivity and significantly improve insulin resistance in diabetic mice.

3.2 *Portulaca oleracea* 马齿苋

The results from Table 3a and 3b shows that, after 21 days of administration, the fasting blood glucose levels of mice (metformin group and each composition from fresh *P. oleracea*) were reduced in different degree; and the decrease of blood glucose levels in high-dose group is obvious than the low-dose group. Besides, the integral administration of the three compositions has better hypoglycemic effect than administered alone.

As compared to the model group, each group that is administered with high-dose of components from fresh *P. oleracea* can increase the insulin level in diabetic mice significantly, especially alkaloids group; while polysaccharides and polyphenols groups can obviously increase the superoxide dismutase (SOD) activity, decrease malonaldehyde (MDA) level, having significant antioxidant effect. Seen in Table 4.