

LIST OF CONTENTS

Chapter	Page
I INTRODUCTION.....	1
Rationale and significance of the study.....	1
Objectives of the study.....	3
The scope of the study.....	3
Hypothesis.....	4
Keywords.....	4
The anticipated outcomes of the study.....	5
II REVIEW OF RELATED LITERATURE AND RESEARCH.....	6
Metabolic syndrome.....	6
Diagnostic criteria used for metabolic syndrome.....	7
Epidemiology of the metabolic syndrome.....	8
Abdominal obesity.....	9
Insulin hormone.....	9
Insulin resistance.....	10
Oral glucose tolerance test.....	11
Hypertension.....	13
Dyslipidemia.....	13
High Fat and high sucrose diet induce metabolic syndrome.....	16
Animal models for metabolic syndrome.....	16
<i>Kaempferia parviflora</i>	19

LIST OF CONTENTS (CONT.)

Chapter	Page
III RESEARCH METHODOLOGY	24
Instruments and materials.....	24
Instruments.....	24
Materials.....	24
<i>K. parviflora</i> crude extract preparation.....	25
Animals.....	25
Methods.....	26
Animal groups.....	26
Composition of the diets	26
Body weight and food intake measurement	28
Glucose tolerance test measurement.....	28
Fasting blood glucose measurement	28
Systolic blood pressure measurement.....	29
Blood and tissues collection.....	30
Serum cholesterol, triglycerides and high-density- lipoprotein cholesterol concentration evaluation.....	30
Histological analysis.....	30
Statistical analysis.....	31

LIST OF CONTENTS (CONT.)

Chapter	Page
IV RESULTS.....	32
Part I: The effects of high fat and high sucrose diet	32
Effect of high fat and high sucrose diet on food intake	32
Effect of high fat and high sucrose diet on body weight	32
Effect of high fat and high sucrose diet on fasting blood glucose concentration	36
Effect of high fat and high sucrose diet on systolic blood pressure.....	36
Part II: The effects of <i>K. parviflora</i> extract on mice fed with high fat and high sucrose diet.....	39
Effect of <i>K. parviflora</i> extract on systolic blood pressure.....	39
Effect of <i>K. parviflora</i> extract on food intake.....	39
Effect of <i>K. parviflora</i> extract on body weight.....	39
Effect of <i>K. parviflora</i> extract on fasting blood glucose.....	42
Effect of acute <i>K. parviflora</i> extract on oral glucose tolerance test.....	42
Effect of subchronic <i>K. parviflora</i> extract on oral glucose tolerance test.....	42
Effect of <i>K. parviflora</i> extract on serum cholesterol, triglycerides and high-density lipoprotein cholesterol.....	50
Effect of <i>K. parviflora</i> extract on visceral fat accumulation and adipocyte morphology.....	52

LIST OF CONTENTS (CONT.)

Chapter	Page
V DISCUSSION AND CONCLUSION.....	55
Effect of high fat and high sucrose diet on food intake, body weight, blood glucose concentration and systolic blood pressure.....	55
Effect of <i>K. parviflora</i> extract on visceral fat accumulation and adipocyte morphology.....	56
Effect of <i>K. parviflora</i> extract on fasting blood glucose.....	57
Effect of <i>K. parviflora</i> extract on oral glucose tolerance test.....	57
Effect of <i>K. parviflora</i> extract on body weight.....	58
Effect of <i>K. parviflora</i> extract on serum cholesterol, triglycerides and high-density lipoprotein cholesterol.....	59
Effect of <i>K. parviflora</i> extract on systolic blood pressure.....	60
Conclusion.....	60
REFERENCES.....	61
APPENDIX.....	76
BIOGRAPHY	80

LIST OF TABLES

Table	Page
1 Composition of the standard chow and high fat and high sucrose diet.....	27
2 The average of the food intake of mice (g/day/mouse) fed with high fat and high sucrose diet during 20 weeks.....	33
3 The body weight (g) of mice fed with high fat and high sucrose diet for 20 weeks	35
4 The fasting blood glucose (mg/dl) in the oral glucose tolerance test of mice at the first day of <i>K. parviflora</i> administration (acute administration).....	46
5 The fasting blood glucose (mg/dl) in the oral glucose tolerance test of mice after administration with <i>K. parviflora</i> extract for 8 weeks.....	49
6 The serum cholesterol, triglycerides and high-density lipoprotein- cholesterol concentration (mg/dl) of mice after administration with <i>K. parviflora</i> extract for 8 weeks	51

LIST OF FIGURES

Figures		Page
1	Conceptual framework.....	4
2	Regulation of insulin hormone release.....	12
3	Insulin receptor signaling and action.....	12
4	Pathways of lipid transport	15
5	The characteristic of C57BL/6 mice; The normal of C57BL/6 mice (A) and diet-induced MetS of C57BL/6 mice (B).....	18
6	The characteristic of <i>Kaempferia parviflora</i> (<i>K. parviflora</i>) The trunk and leaves of <i>K. parviflora</i> (A) and the rhizome of <i>K. parviflora</i> (B).....	22
7	The main active compounds of <i>Kaempferia parviflora</i>	23
8	Oral glucose tolerance test measurement.....	28
9	Experimental schedule.....	29
10	The body weight of mice fed with high fat and high sucrose diet for 20 weeks.....	34
11	The fasting blood glucose concentration of mice fed with high fat and high sucrose diet for 20 weeks.....	37
12	The systolic blood pressure of mice administration with <i>K. parviflora</i> extract for 8 weeks.....	38
13	The food intake of mice during administration with <i>K. parviflora</i> extract for 8 weeks.....	40
14	The body weight of mice during administration with <i>K. parviflora</i> extract for 8 weeks.....	41
15	The fasting blood glucose concentration of mice before and after treatment with <i>K. parviflora</i> extract for 8 weeks.....	43
16	The oral glucose tolerance test of mice at the first day of <i>K. parviflora</i> administration (acute administration).....	44

LIST OF FIGURES (CONT.)

Figures		Page
17	The areas under the curve of mice at the first day of <i>K. parviflora</i> administration (acute administration).....	45
18	The oral glucose tolerance test of mice after administration with <i>K. parviflora</i> extract for 8 weeks.....	47
19	The areas under the curve of mice after administration with <i>K. parviflora</i> extract for 8 weeks.....	48
20	The visceral fat accumulation in mice that administered <i>K. parviflora</i> extract for 8 weeks.....	53
21	Microscopic photographs of adipocytes from the visceral fat (40X) after 8 weeks of <i>K. parviflora</i> treatment	54

ABBREVIATIONS

HFHS	=	High fat and high sucrose
MetS	=	Metabolic syndrome
C	=	Control
<i>K. parviflora</i>	=	<i>Kaempferia parviflora</i>
PGE ₂	=	Prostaglandin E ₂
TSOD	=	Tsumura, Suzuki, Obese Diabetes
KPE	=	<i>Kaempferia parviflora</i> extract
OGTT	=	Oral glucose tolerance test
HDL-C	=	High-density lipoprotein cholesterol
WHO	=	World Health Organization
NAFLD	=	Non-alcoholic fatty liver disease
EGIR	=	European Group for the Study of Insulin Resistance
NCEP	=	National Cholesterol Education Program
IDF	=	International Diabetes Federation
AHA	=	American Heart Association
NHLBI	=	National Heart Lung and Blood Institutes
ATP III	=	Adult Treatment Panel III
cm	=	Centimeter
mg	=	Milligram
dl	=	Deciliter
mmHg	=	Millimetres of mercury
USA	=	United States of America
β-cells	=	Beta cell
CCK	=	Cholecystokinin
GLUT	=	Glucose transporter
IRS-1	=	Insulin receptor substrates 1
PI3Ks	=	Phosphatidylinositol-3-kinase
TNFα	=	Tumor necrosis factor-α
IL-6	=	Interleukin 6

ABBREVIATIONS (CONT.)

NF- κ B	=	Nuclear factor kappa-light-chain-enhancer of activated B
CRP	=	C-reactive protein
g	=	Gram
kg	=	Kilogram
BW	=	Body weight
LDL-C	=	Low-density lipoprotein cholesterol
VLDL	=	Very low density lipoprotein
FFA	=	Free fatty acids
NASH	=	Nonalcoholic steatohepatitis
NAFPD	=	Non-alcoholic fatty pancreatic disease
iNOS	=	Inducible nitric oxide synthase
MRP	=	Multidrug resistance associated-proteins
μ l	=	Microliter
i.p.	=	Intraperitoneal
$^{\circ}$ C	=	Celsius
μ m	=	Micrometer
SEM	=	Standard error of the mean
ANOVA	=	Analysis of variance
h	=	Hour
vs	=	Versus
HMG-CoA	=	3-hydroxy-3-methylglutaryl-coenzyme A