EFFECT OF TRIKATU ON LIVER FUNCTION AND PROTEOME CHANGE IN RAT

CHARTCHAI CHAICHANA

A Thesis Submitted to the Graduate School of Naresuan University
in Partial Fulfillment of the Requirements
for the Master of Science Degree in Biochemistry
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This thesis entitled "Effect of Trikatu on liver function and proteome change in rat" submitted by Chartchai Chaichana in partial fulfillment of the requirements for the Master of Science Degree in Biochemistry is hereby approved.

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Chartchai Chaichana

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ABSTRACT

Trikatu is a Thai traditional herbal formulation consisting of three herbs in equal amount, *Piper nigrum*, *Piper longum* and *Zinggiber officinale*. It is suggested to be beneficial in control blood lipid. However, the scientific evidence supporting such claim has not yet been fully elucidated. The aim of this study was to identify mechanisms of Trikatu effects on lipid metabolism in rat liver using a physical parameter, biochemical parameter and proteomics approach. The 200-250 g male Wistar rats were randomly divided into six groups (n=6). The acute groups were treated with 500 and 1,000 mg/kg B.W. of Trikatu for 7 days and the subacute groups were treated with 50 and 150 mg/kg B.W. of Trikatu for 30 days. The control group was fed with 10% (w/v) propylene glycol solution. Daily changes of body weight, vital organs weight, serum lipid profile and AST/ALT enzymes were monitored. Rat livers were collected and used for proteome profile analysis. Histopathological examination of rat livers was also performed. Trikatu showed no effects on the body weight and vital organs weight (kidney, heart, lung and spleen). Significant increase of liver weight after feeding with 150, 500 and 1,000 mg/kg B.W. of Trikatu was observed. The serum AST/ALT and HDL-c level were not altered but a significant decrease in the serum triglyceride and cholesterol level was reported. In addition, the liver proteome of Trikatu fed rat was altered. These differential expressed proteins are involved in insulin signaling, glucose and lipid metabolism. Significant up-regulated proteins associated with glucose uptake and energy production were found. However, the proteins related to fatty acid oxidation and fatty acid synthesis decreased. Further

functional study of these proteins may be helpful in the elucidation of the pharmacological mechanism and identification of new drug targets for lowering lipid by Trikatu.

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ABBREVIATIONS

xg	=	Gravity
%(w/v)	=	Percentage weight/volume
%(w/w)	=	Percentage weight/weight
µM	=	Micromolar
µm	=	Micrometre
°C	=	Degree of celsius
ACAT	=	Acetyl-Coenzyme A acetyltransferase
ACN	=	Acetonitrile
ADP	=	Adenosine diphosphate
AE	=	Antiepilepsirine
ALP	=	Alkaline phosphatase
ALT	=	Alanine aminotransferase
ApoB	=	Apolipoprotein B
AST	=	Aspartate aminotransferase
ATP	=	Adenosine triphosphate
BSA	=	Bovine serum albumin
CCl4	=	Carbon Tetrachloride
$CuSO_4$	=	Copper sulphate
DGAT	=	Diglycerideacyltransferase
DNPH	=	2,4-Dinitrophenylhydrazine
DOC	=	Deoxycholate
DTT	=	Dithiothreitol
ESI	=	Electrospry ionization
FA	=	Formic acid
g	=	Gram
GPT	=	Glutamate Pyruvate Transaminase
GSH	=	Glutathione
GTP	=	Guanosine triphosphate
HDL-c	=	High-density lipoprotein chloresterol

ABBREVIATIONS (CONT.)

i.d.	=	Internal diameter
IAA	=	Iodoacetamide
KEGG	=	Kyoto Encyclopedia of Genes and Genomes
LC-MS	=	Liquid chromatography–mass spectrometry
LDL-c	=	Low-density lipoprotein chloresterol
LDLR	=	Low density lipoprotein receptor
LPO	=	Lipid peroxidation
m/z	=	Mass-to-charge ratio
mg/dl	=	Milligrams per deciliter
mg/kg B.W.	=	Milligram per kilogram body weight
min.	=	Minute
mL	=	Milliliter
mM	=	Millimolar
mm	=	Millimetre
M	=	Molar
Mev	=	MultiExperiment Viewer
nL	=	Nanoliter
nm	=	Nanometre
NADPH	=	Nicotinamide adenine dinucleotide phosphate
NaOH	=	Sodium hydroxide
NK cell	=	Natural killer cells
PAF	=	Platelet activating factor
PBS	=	Phosphate buffered saline
QC	=	Quality control
rpm	=	Revolutions per minute
SDS-PAGE	=	Sodium dodecyl sulfate polyacrylamide gel electrophoresis
sec.	=	Second
SEM	=	Standard error of the mean

ABBREVIATIONS (CONT.)

STRAP	=	Software Tool for Rapid Annotation of Protein
STRING	=	Software Tool for the Retrieval of Interacting Genes
TBK	=	Test blank
TC	=	Total cholesterol
TCA	=	Trichloroacetic acid
TG	=	Total triglyceride
TOF	=	Time-of-flight
U/L	=	Unit per liter
UDP-glucose	=	Uridine diphosphate glucose
V	=	Voltage
VLDL	=	Very-low-density lipoprotein