

**HEAVY METAL ANALYSIS OF HERBAL PLANTS USED IN
TRADITIONAL TREATMENT OF HYPERTENSION (HIGH
BLOOD PRESSURE)**

SITI MUNIRAH BINTI WAHAB

**Final Year Project Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA**

JULY 2017

ABSTRACT

DETERMINATION OF HEAVY METAL IN HERBAL PLANTS USED FOR TREATMENT OF HYPERTENSION

The objective of this study is to determine concentration of heavy metal in the leaf of herbal plant that used to treat hypertension. The selected herbal plants are *Andrographis Paniculata* (Hempedu Bumi), *Orthosiphon Aristatus* (Misai Kucing) and *Vernonia Amygdalina* (Pokok Bismillah). The chosen heavy metals studied were chromium (Cr), iron (Fe), lead (Pb) and zinc (Zn). All the samples were analysed by Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES). The concentration of heavy metals in the leaf of herbal plants range 1.75 mg/kg to 3.75 mg/kg for Cr, 313.67 mg/kg to 586 mg/kg for Fe, 13.58 mg/kg to 19.83 mg/kg for Pb and 43.83 mg/kg to 87.33 mg/kg for Zn. The trends of concentration of heavy metals in each medicinal plants in decreasing order was Fe > Zn > Pb > Cr. The pollution index (PI) of each heavy metal was estimated and all the pollution index was less than 1 which no pollution occurred in each selected herbal plant. It is recommended that more types of herbal plants should be studied and the number sampling sites also should be increased.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURE	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
ABSTRAK	x
CHAPTER 1 INTRODUCTION	
1.1 Background of study	1
1.2 Problem Statement	4
1.3 Significance of study	5
1.4 Scope of study	6
1.5 Objectives of study	6
CHAPTER 2 LITERATURE REVIEW	
2.1 Herbal Plant (Medicinal Plant)	7
2.1.1 Andrographis Paniculata (Hempedu Bumi)	8
2.1.2 Orthosiphon Aristatus (Pokok Misai Kucing)	9
2.1.3 Vernonia Amygdalina (Pokok Bismillah)	9
2.2 Heavy Metal	10
2.3 Previous Study	11
2.4 Effect and Sources of Heavy Metals	13
2.4.1 Effects of Chromium (Cr)	14
2.4.2 Effects of Zinc (Zn)	15
2.4.3 Effects of Iron (Fe)	16
2.4.4 Effects of Lead (Pb)	17
2.5 Analysis of herbal plants by using Spectrometers	17
CHAPTER 3 METHODOLOGY	
3.1 Materials	19
3.1.1 Raw Materials	19
3.1.2 Chemicals	19
3.1.3 Glassware and Apparatus	19
3.1.4 Equipment	20
3.2 Methods	20
3.2.1 Sample Collection	20
3.2.2 Pre Treatment of samples	20
3.2.3 Pre Treatment of glassware	20

3.2.4	Procedure	21
3.2.5	Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)	21
3.2.6	Standard Solution Preparation	22
3.3	Heavy Metal Pollution Assessment	23
3.3.1	Pollution Index	23
3.4	Flowchart of Procedure	24

CHAPTER 4 RESULT AND DISCUSSION

4.1	Calibration Curve	25
4.2	Heavy Metal Concentrations in Plant	26
4.2.1	Chromium	27
4.2.2	Iron	28
4.2.3	Lead	30
4.2.4	Zinc	31
4.2.5	Concentrations of All Heavy Metals	32
4.3	Pollution Index	34
4.3.1	Chromium	35
4.3.2	Lead	36
4.3.3	Zinc	37
4.4	Hazard Quotient	38

CHAPTER 5 CONCLUSION AND RECOMMENDATION 40

CITED REFERENCES	42
APPENDICES	45
CURRICULUM VITAE	46

LIST OF TABLES

Table	Caption	Page
2.4	Types of heavy metals and their effect on human health with their permissible limits	14
2.5	Characteristics of Spectrometers	18
4.1	Regression Coefficient of each heavy metals analyzed by ICP-OES	25
4.2	The permissible limit of heavy metal in plant (WHO)	26
4.3	Regulatory limit of heavy metal (US EPA)	34
4.4	Hazard quotient of heavy metals in all the herbal plant studied	39