

## TABLE OF CONTENTS

<b>APPROVAL SHEET</b>	ii
<b>DECLARATION STATEMENT</b>	iii
<b>DEDICATIONS</b>	iv
<b>ACKNOWLEDGEMENT</b>	v
<b>TABLE OF CONTENTS</b>	vi
<b>LIST OF FIGURES</b>	viii
<b>LIST OF TABLES</b>	x
<b>ABBREVIATIONS</b>	xi
<b>LIST OF APPENDECIS</b>	xiii
<b>LIST OF PUBLICATIONS</b>	xiv
<b>ABSTRACT</b>	xv
<b>INTISARI</b>	xvi
<b>CHAPTER 1 INTRODUCTION</b>	1
1.1 Background	1
1.2 Research Problems	5
1.3 Novelty and Originality of the Research	6
1.4 Objectives of the Research	8
1.5 Significance of the Research	8
<b>CHAPTER 2 LITERATURE REVIEW AND HYPOTHESIS</b>	9
2.1 Literature Review	9
2.1.1 Bacterial infections and protection measures	9
2.1.2 Bacterial resistance to antibiotics	11
2.1.3 Breast cancer	12
2.1.4 Bioactive peptides	13
2.1.5 Venom protein	15
2.1.6 Extractions of protein from the venom	19
2.1.7 Hydrolysis of proteins	19
2.1.8 The Antibacterial activity of snake venom peptides	22
2.1.9 Anticancer activity of snake venom peptides	22
2.1.10 Bioactive Peptides identifications by HRMS	25
2.1.11 Proteome analysis (Proteomics)	27
2.1.12 Mechanism of action of antimicrobial peptides	29
2.2 Hypothesis	34
2.2.1 Hypothesis I	34
2.1.2 Hypothesis II	35
2.1.3 Hypothesis III	35
2.1.4 Study Planning	35
<b>CHAPTER 3 RESEARCH METHOD</b>	38
3.1 Instruments and Chemicals	38
3.1.1 Chemicals	38
3.1.2 Instruments	38
3.2 Research Procedure	39
3.2.1 Milking of snake venom	39
3.2.2 Extraction of venom protein	39
3.2.3 Proteome analysis of venom protein	40

3.2.4	Preparation of venom protein hydrolysate	41
3.2.5	Fractionation of venom hydrolysate using cationic exchange SPE column	42
3.2.6	Antimicrobial activity test	42
3.2.7	Fractionation of venom hydrolysate using reversed phase SPE column	43
3.2.8	Anticancer activity test	44
3.2.9	Identification of antibacterial and anticancer peptides	45
3.2.10	Molecular docking of peptides	46
<b>CHAPTER 4</b>	<b>RESULTS AND DISCUSSION</b>	48
4.1	Venom Milking	48
4.2	Venom Protein Extraction	49
4.3	Proteome Profile of the <i>N. sumatrana</i> Snake Venom Protein	50
4.3.1	Venom proteome analysis	50
4.3.2	Potential antibacterial peptides based on proteome analysis	54
4.3.3	Docking of antibacterial peptides obtained during proteome analysis	61
4.4	Venom Protein Hydrolysate for Peptide Preparation	64
4.5	Antibacterial Peptides from <i>N. sumatrana</i> Venom's Hydrolysate	68
4.5.1	Antibacterial activity of venom protein hydrolysate	68
4.5.2	Antibacterial activity of ion exchanged chromatography fractionations	71
4.5.3	Identification of antibacterial peptides	74
4.5.4	Molecular docking to explain antibacterial activity	80
4.6	Anticancer Peptides from <i>N. sumatrana</i> Venom Protein Hydrolysate	96
4.6.1	Toxicity of venom protein and hydrolysate	96
4.6.2	Anticancer activity of Reverse phase fractionations	97
4.6.3	Identification of anticancer peptides	101
4.6.4	Molecular docking to explain anticancer activity	110
<b>CHAPTER 5</b>	<b>CONCLUSIONS AND SUGGESTIONS</b>	116
5.1	Conclusions	116
5.2	Suggestions	117
<b>REFERENCES</b>		118
<b>APPENDICES</b>		133