

TABLE OF CONTENTS

ABSTRACT.....	i
ABSTRAK.....	iii
ACKNOWLEDGEMENTS.....	v
TABLE OF CONTENTS.....	vii
LIST OF FIGURES.....	xii
LIST OF TABLES.....	xix
LIST OF SYMBOLS AND ABBREVIATIONS.....	xxii
LIST OF APPENDICES.....	xxiv
LIST OF PUBLICATIONS.....	xxv

CHAPTER 1: GENERAL INTRODUCTION AND LITERATURE REVIEW

CHAPTER 1: GENERAL INTRODUCTION AND LITERATURE REVIEW.....	1
1.1 REVIEW ON SKIN.....	1
1.1.1 FUNCTIONS OF SKIN.....	1
1.1.2 ANATOMY AND HISTOLOGY OF SKIN.....	2
1.1.2.1 EPIDERMIS.....	2
1.1.2.2 DERMIS.....	4
1.1.2.3 HYPODERMIS.....	5
1.2 REVIEW ON WOUNDS AND WOUND HEALING.....	6
1.2.1 CLASSIFICATION OF WOUNDS.....	6
1.2.2 CATEGORIES OF WOUND HEALING.....	7
1.2.3 PRINCIPLES OF WOUND HEALING.....	7
1.2.3.1 INFLAMMATORY PHASE.....	8
1.2.3.2 PROLIFERATIVE PHASE.....	11
1.2.3.3 REMODELING PHASE.....	15
1.2.4 PROBLEMS AND FACTORS AFFECTING WOUND HEALING...16	
1.3 REVIEWS ON WOUND CARE.....	18
1.3.1 WOUND DRESSINGS.....	18
1.3.2 NATURAL PRODUCTS AND WOUND HEALING.....	19

1.4	REVIEW ON HONEY IN WOUND DRESSING.....	20
1.4.1	NOMENCLATURE OF HONEY.....	21
1.4.2	GENERAL CHARACTERISTICS OF HONEY.....	21
1.4.3	HONEY AS WOUND DRESSING.....	24
1.5	RESEARCH OBJECTIVES.....	26

CHAPTER 2: HONEY PURITY TESTS

CHAPTER 2: HONEY PURITY TESTS.....	28
2.1 INTRODUCTION.....	28
2.2 RESEARCH OBJECTIVES.....	30
2.3 MATERIALS AND METHODS.....	31
2.3.1 MATERIALS.....	31
2.3.1.1 HONEY SAMPLES.....	31
2.3.1.2 CHEMICALS AND REAGENTS.....	32
2.3.1.3 INSTRUMENTS AND APPARATUS.....	33
2.3.2 METHODS.....	33
2.3.2.1 DETERMINATION OF HYDROXYMETHYLFURFURAL (HMF)	33
2.3.2.2 DETERMINATION OF SUGAR PROFILE	35
2.3.2.3 DETERMINATION OF WATER CONTENT IN HONEY.....	36
2.3.2.4 DETERMINATION OF HYDROGEN PEROXIDE.....	37
2.3.2.5 DETERMINATION OF pH LEVEL.....	38
2.4 RESULTS AND DISCUSSIONS.....	38
2.4.1 HMF LEVEL IN HONEY SAMPLES.....	38
2.4.2 SUGAR PROFILE IN HONEY	41
2.4.3 WATER CONTENT IN HONEY.....	45
2.4.4 pH LEVEL IN HONEY.....	47
2.4.5 HYDROGEN PEROXIDE IN HONEY.....	48
2.5 CONCLUSION.....	50

CHAPTER 3: MACROSCOPIC EVALUATION OF WOUND HEALING

CHAPTER 3: MACROSCOPIC EVALUATION OF WOUND HEALING.....	51
3.1 INTRODUCTION.....	51
3.1.1 WOUND MODELS.....	51
3.1.2 PARAMETERS OF MACROSCOPIC EVALUATION.....	52
3.1.3 EFFECTS OF HONEY ON ANIMAL MODELS.....	53
3.2 RESEARCH OBJECTIVES.....	54
3.3 MATERIALS AND METHODS.....	55
3.3.1 MATERIALS.....	55
3.3.1.1 EXPERIMENTAL ANIMAL.....	55
3.3.1.2 WOUND DRESSING.....	56
3.3.1.3 CHEMICALS AND REAGENTS.....	57
3.3.1.4 INSTRUMENTS AND APPARATUS.....	57
3.3.2 METHODS.....	58
3.3.2.1 ETHICS.....	58
3.3.2.2 EXPERIMENTAL WOUND MODEL.....	58
3.3.2.3 WOUNDING PROCEDURES.....	59
3.3.2.4 GROUPING AND MODE OF TREATMENTS.....	61
3.3.2.5 SAMPLING.....	62
3.3.2.6 ASSESSMENT AND MACROSCOPIC EVALUATION OF WOUND HEALING.....	62
3.3.3 STATISTICAL ANALYSIS.....	65
3.4 EXPERIMENTAL RESULTS.....	66
3.4.1 BODY WEIGHTS.....	66
3.4.2 DURATION OF WOUND HEALING.....	67
3.4.3 GROSS MORPHOLOGY AND MACROSCOPIC OBSERVATION..	68
3.4.4 WOUND SIZE AND HEALED AREA.....	74
3.4.5 WOUND CONTRACTION.....	79
3.4.6 WOUND APPEARANCE.....	83
3.5 DISCUSSIONS.....	94
3.6 CONCLUSION.....	104

CHAPTER 4: MICROSCOPIC EVALUATION OF WOUND HEALING

CHAPTER 4: MICROSCOPIC EVALUATION OF WOUND HEALING.....	106
4.1 INTRODUCTION.....	106
4.1.1 ACUTE WOUND HEALING.....	106
4.1.2 HISTOLOGICAL ASSESSMENT OF WOUND HEALING.....	109
4.2 OBJECTIVES.....	111
4.3 MATERIALS AND METHODS.....	112
4.3.1 MATERIALS.....	112
4.3.1.1 EXPERIMENTAL ANIMAL.....	112
4.3.1.2 WOUND DRESSING.....	112
4.3.1.3 CHEMICALS AND REAGENTS.....	112
4.3.1.4 INSTRUMENTS AND APPARATUS.....	113
4.3.2 METHODS.....	113
4.3.2.1 ETHICS.....	113
4.3.2.2 EXPERIMENTAL WOUND MODEL.....	113
4.3.2.3 WOUND PROCEDURES.....	114
4.3.2.4 TISSUE SAMPLE PREPARATION AND HISTOLOGICAL TISSUE PROCESSING.....	114
4.3.2.4.1 TISSUE ABSTRACTION AND SAMPLING.....	114
4.3.2.4.2 FIXATION.....	114
4.3.2.4.3 TISSUE PROCESSING.....	115
4.3.2.4.4 SECTIONING.....	117
4.3.2.4.5 DEPARAFFINATION AND HYDRATION.....	118
4.3.2.4.6 HISTOLOGICAL STAINING.....	119
I) HEMATOXYLIN AND EOSIN (H&E) STAINING TECHNIQUE.....	119
II) MASSON’S TRICHROME STAINING PROTOCOL.....	120
III) VERHOEFF’S ELASTIN STAIN.....	122
4.3.2.4.7 MICROSCOPIC EVALUATION OF WOUND HEALING.....	123
4.3.3 STATISTICAL ANALYSIS.....	124
4.4 EXPERIMENTAL RESULTS.....	125

4.4.1	NUMBER OF MACROPHAGES.....	125
4.4.2	EPITHELIALIZATION.....	127
4.4.3	ANGIOGENESIS.....	128
4.4.4	FIBROPLASIA.....	130
4.4.5	COLLAGEN CONTENT.....	131
4.4.6	MICROSCOPIC EVALUATION.....	133
4.4.6.1	DAY 1 OF TREATMENTS.....	133
4.4.6.2	DAY 5 OF TREATMENTS.....	139
4.4.6.3	DAY 10 OF TREATMENTS.....	150
4.4.6.4	DAY 15 OF TREATMENTS.....	161
4.5	DISCUSSIONS.....	171
4.6	CONCLUSION.....	178

CHAPTER 5 GENERAL DISCUSSIONS

CHAPTER 5 GENERAL DISCUSSIONS.....	179
5.1 DISCUSSIONS.....	179
5.2 SUGGESTION FOR FURTHER STUDIES.....	191

CHAPTER 6 CONCLUSIONS

CHAPTER 6 CONCLUSIONS.....	192
6.1 CONCLUSIONS.....	192

REFERENCES.....	195
APPENDIX.....	207