

**EFFECTS OF *GARCINIA MANGOSTANA* LINN. ON WOUND
HEALING IN EXPERIMENTAL WOUND MODELS IN RATS:
A PRELIMINARY STUDY**

ABSTRACT

BY

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III PREFACE

Wound healing occurs in three main but overlapping phases, namely, inflammation, proliferation and remodeling. Underlying metabolic disturbances and/or disease may disrupt the regenerative process, causing delayed healing. This has imposed a huge financial burden in both the developed and undeveloped countries. As a result, the possibility of deriving alternative, cost effective therapies from traditional plant-based medicines has been explored. Traditional forms of medicine practiced for centuries in Africa and Asia are being scientifically investigated for their potential in the treatment of wounds and related disorders.

Garcinia mangostana Linn. or commonly known as mangosteen is native in South East Asia is well known as traditional remedy for dysentery and wounds. To date there are many in vitro studies to demonstrate its medicinal property namely anti-inflammatory, anti-oxidant, anti-tumoural, antibacterial and recently analgesic property. There is no scientific study to demonstrate its potential towards promoting wound healing.

Therefore it is hopeful that this study would provide a preliminary insight regarding wound healing potential of pericarp of *Garcinia mangostana* L.

IV TABLE OF CONTENTS

<u>Contents</u>	page numbers
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I	Frontispiece	i
II	Acknowledgements	ii
III	Preface	iv
IV	Table of Contents	v
V	Abbreviations	viii
VI	List of Figures	ix
VII	List of Tables	x
VIII	Abstrak	xii
IX	Abstract	xiv

1.0	Introduction and Literature Review	1
1.1	Research background	1
1.2	Wound healing	2
1.3	Factors in wound healing	6
1.4	Experimental animal wound models	7
1.4.1	Incision wound model	8
1.4.2	Excision wound model	8
1.5	Usage of medicinal plant for wound healing	9

1.6	<i>Garcinia mangostana</i> Linn.	10
1.6.1	Active ingredient of pericarp of <i>Garcinia mangostana</i> Linn.	11
1.6.2	Anti- inflammatory property of <i>Garcinia mangostana</i> Linn.	12
1.6.3	Anti-bacterial,anti-fungal and anti-viral property of <i>Garcinia mangostana</i> Linn. ...	13
1.6.4	Analgesic property of <i>Garcinia</i> <i>mangostana</i> Linn.	15
1.6.5	Anti-oxidant property of <i>Garcinia mangostana</i> Linn.	16
1.6.6	Other medicinal properties of <i>Garcinia mangostana</i> Linn.	17
2.0	Objectives.....	18
3.0	Material and methods.....	19
3.1	Fruit material and extract preparation	19
3.2	Animal	19
3.3	Skin preparation	20
3.4	Surgery	20
3.5	Experimental wound models	21
3.5.1	Excision wound model	21
3.5.2	Incision wound model	23
3.6	Determination of wound breaking strength	23

3.7	Pilot study	24
3.8	Tissue preparation	25
3.9	Semiquantitative histological analysis	25
3.10	Statistical analysis	26
4.0	Results	30
4.1	Excision wound model	30
4.1.1	General appearance	30
4.1.2	Wound contraction	31
4.1.3	Period of epithelization	36
4.2	Incision wound model	38
4.2.1	General appearance	38
4.2.2	Wound breaking strength	38
4.3	Semiquantitative histological analysis	39
4.3.1	Excision wound model	39
4.3.2	Incision wound model	39
5.0	Discussion	45
6.0	Conclusion	53
7.0	Limitations and Recommendations	54
8.0	References	57
9.0	Appendixes	63

V ABBREVIATION

Abbreviation

PDGF	Platelet-derived growth factor
EGF	Epidermal growth factor
NSAIDs	Non-steroidal anti-inflammatory drugs
NO	Nitric oxide
PGE₂	Prostaglandin E₂
POD	Post operative day

VI LIST OF FIGURES

List of Figures

FIGURE	TITLE	PAGE
Fig. 1	Study flow chart for excision wound model	28
Fig. 2	Study flow chart for incision wound model	29
Fig. 3	Appearance of excision wound model treated with <i>Garcinia mangostana</i> L. extract at post-operative day 1	33
Fig. 4	Appearance of excision wound model treated with <i>Garcinia mangostana</i> L. extract at post-operative day 13	33

VII LIST OF TABLES

List of Tables

TABLES	TITLES	PAGE
Table 1	Mean (SD) and Median (Interquartile Range) of wound surface area (mm ²) in treatment group treated with <i>Garcinia mangostana</i> L. extract and control group which were not treated	32
Table 2	Difference in wound contraction post-operative day 1 (D1-D0), post-operative day 5 (D5-D0) and post-operative day15 (D15-D0)	34
Table 3	Comparison of days of epithelization between group treated with <i>Garcinia mangostana</i> L. extract and control group	36
Table 4	Comparison of breaking strength (g) between group treated with <i>Garcinia mangostana</i> L. extract and control group	40
Table 5	Semiquantitative histological scoring system	41
Table 6	Semiquantitative histological analysis of inflammation, angiogenesis and fibroblast proliferation for wounds in excision wound model	42

Table 7	Semiquantitative histological analysis of inflammation, angiogenesis and fibroblast proliferation in incision wound model	43
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VIII ABSTRAK

Penyembuhan luka adalah satu proses yang kompleks. Ia melibatkan kesinambungan pelbagai jenis sel, perantara dan faktor pertumbuhan di dalam tiga fasa yang bertindih. Pengetahuan dan pemahaman mengenai penyembuhan luka dan kaedah membalut luka telah berkembang dengan peredaran masa. Pengurusannya pula melibatkan kos yang tinggi. Oleh itu penyelidikan kini cuba mencari kaedah alternatif daripada sumber semulajadi untuk rawatan penyembuhan luka. Potensi penyembuhan luka oleh manggis atau nama saintifiknya *Garcinia mangostana* Linn. belum pernah dikaji lagi. Walau bagaimanapun terdapat banyak penyelidikan saintifik yang melibatkan kelebihan manggis dalam bidang perubatan. Oleh yang demikian kajian ini dijalankan untuk mengetahui dan mengaitkan kebaikan manggis terhadap proses penyembuhan luka.

Objektif utama kajian ini adalah untuk mengkaji keberkesanan ekstrak kulit buah manggis dalam penyembuhan luka terhadap haiwan penyelidikan. Secara spesifiknya, pengecutan luka, tempoh penutupan luka dan kekuatan bukaan luka telah dikaji. Kajian terhadap pengecutan luka dan tempoh penutupan luka dikaji melalui model luka terbuka yang melibatkan 10 ekor tikus yang di rawat dengan ekstrak kulit buah manggis dan 10 lagi yang tidak dirawat bertindak sebagai kawalan. Kekuatan pembukaan luka pula dikaji melalui model luka tertutup yang

melibatkan 6 ekor tikus di setiap lengan. Apabila tamat kajian, tisu luka diambil untuk penyelidikan histologi secara separa kuantitatif.

Keputusannya, kajian ini menunjukkan bahawa luka yang dirawat dengan ekstrak kulit buah manggis mempunyai peningkatan signifikan dalam pengecutan luka pada hari pertama dan kelima selepas pembedahan dengan nilai $p < 0.001$ dan < 0.005 masing-masing. Ia juga menunjukkan bahawa kekuatan pembukaan luka lebih tinggi jika luka dirawat dengan ekstrak kulit buah manggis dengan nilai $p=0.04$. Walaubagaimanapun, kaedah histologi separa kuantitatif tidak menunjukkan perbezaan yang signifikan dari segi inflamasi, pertumbuhan salur darah dan proliferasi fibroblas.

Kesimpulannya, kajian awal ini menunjukkan wujudnya potensi ekstrak kulit buah manggis dalam penyembuhan luka. Namun begitu, mekanisme sebenar masih kabur dan memerlukan banyak lagi kajian *in vivo* dan *in vitro* di masa akan datang sebelum kajian saintifik terhadap manusia boleh dilakukan.

IX ABSTRACT

Wound healing is a very complex interplay between the overlapping phases, involving many cell types, mediators and growth factors. The amount of knowledge and understanding concerning the wound healing process and dressing practices has expanded and changed overtime. Its management is often costly. Therefore researchers are exploring alternative solution from natural sources that are useful in wound healing.

Garcinia mangostana Linn. or mangosteen has never been scientifically studied for its wound healing potential. However there are numerous *in vivo* and *in vitro* studies that pointed to the medicinal properties of *Garcinia mangostana* L. Therefore this study aims to explore and relate the medicinal properties to wound healing in an animal wound model.

The main objective of this study is to evaluate the effect of *Garcinia mangostana* L. on specific wound healing properties in rats namely wound contraction, period of epithelization and breaking strength. A semi quantitative histological examination was also performed. The wound contraction and epithelization were studied in an excision wound model which comprise of 10 rats in treatment group and 10 rats which were not treated acted as control. The wound breaking strength was studied in the incision wound model comprised of 6 rats in each group.

This study demonstrated a significant increase in wound contraction at post operative day one and post operative day five in wounds treated with *Garcinia mangostana* L. extract with p value of < 0.001 and 0.005 respectively. It was also found that the wound breaking strength was significantly higher in the treatment group with p value of 0.04 . Unfortunately semiquantitative histological analysis did not show any significant difference in inflammation, angiogenesis and fibroblast proliferation.

In conclusion, *Garcinia mangostana* L. showed evidence of wound healing promotion. However the exact mechanism is still vague requiring further *in vitro* and *in vivo* studies before a clinical study could be performed.