

THE POSSIBLE EFFECT OF GARLIC AND CINNAMON ON INDUCED MUCOSITIS IN BUCCAL MUCOSA OF ALBINO RATS SUBJECTED TO GAMMA RADIATION

Thesis

Submitted to Faculty of Dentistry - Ain Shams University
In partial fulfillment of the requirement of the Doctor Degree
in **Oral Biology**

By

Randa Hassan Mokhtar

B.D.S (Ain Shams University, 2003)M.Sc. (Cairo University, 2013)

Faculty of Dentistry Ain Shams University 2018

SUPERVISORS

Prof.Dr. Reham Magdy Mohamed Amin

Professor of Oral Biology
Oral Biology Department
Faculty of Dentistry - Ain Shams University

Prof. Dr. Nabil Ali El- Faramawy

Professor of Nuclear and Radiation Physics

Department of Physics

Faculty of Science - Ain Shams University



Dedication

My Dear Kusband Moalaz

For being extremely supportive

My Family

My Mother and Father

For always being there

My Kids

Thanks for being in my life

Maya and Marwan

Acknowledgement

First and foremost, I feel always indebted to "ALLAH" the kindest and the most merciful.

I would like to express my deepest gratitude and sincere appreciation to **Prof. Dr. Reham Magdy**, Professor of Oral Biology Department, Faculty of Dentistry, Ain Shams University for her continuous encouragement, support and appreciated suggestions that guided me through this work.

I cannot afford to forget to thank **Prof. Dr. Nabil Ali El-Faramawy**, Professor of Nuclear and Radiation Physics, Department of Physics, Faculty of science - Ain Shams University for his constant encouragement and his kind support and advice whenever needed throughout my practical and personal life. He is like a father all the time.

I am also grateful to **Dr. Ahmed Halawa**, Head of department of Oral Biology, Faculty of Dentistry, Ain Shams University, for his endless support and patience.

Thanks for all the **BUE Oral Biology Staff** and for all my friends.

CONTENTS

| | page |
|--|---------|
| List of Abbreviations | II |
| List of tables | III |
| List of figures | ${f V}$ |
| Introduction | 1 |
| Review of literature | 2 |
| Ionizing radiation | 2 |
| General effect of irradiation on body organs | 3 |
| Oral adverse effect of radiation | 5 |
| Effect of irradiation on teeth | 6 |
| Effects on salivary glands and oral mucosa | 8 |
| Histology of Buccal mucosa | 10 |
| Oral mucositis | 11 |
| Beneficial uses of natural herbs | 12 |
| Chemistry and forms of Garlic | 14 |
| Beneficial effects of Garlic | 16 |
| Chemistry and forms of Cinnamon | 18 |
| Beneficial effects of Cinnamon | 18 |
| Aim of the study | 20 |
| Materials and Methods | 21 |
| Results | 33 |
| Discussion | 89 |
| Conclusion | 98 |
| Recommendations | 99 |
| References | 100 |
| Summary | 117 |
| Arabic Summary | - |

LIST OF ABBREVIATIONS

| μm | Micrometer |
|--------|------------------------------------|
| Bv | Blood vessel |
| Cn | Cinnamon |
| ECM | Extra cellular matrix |
| Fig. | Figure |
| Gr | Garlic |
| Grp | Group |
| Gy | Gray |
| Hx&E | Haematoxylin and Eosin |
| IMRT | Intense-modulated radiotherapy |
| LM | Light microscopy |
| Mm | Millimeter |
| MMP | Matrix Metaloproteases |
| PCNA | Proliferating Cell Nuclear Antigen |
| Rad | Radiation absorbed dose |
| RBCs | Red blood cells |
| ROS | Reactive oxygen species |
| Wks | Weeks |
| γ-rays | Gamma rays |

LIST OF TABLES

| Table no. | Title | page |
|-----------|--|------|
| 1 | Mean values, standard deviations (SD) for PCNA recorded for experimental groups as function medication | 26 |
| 2 | Mean values, standard deviations (SD) for epithelium thickness recorded for all groups as function of radiation and medication | 65 |
| 3 | Comparison of mean values, standard deviations (SD) for epithelium thickness between control subgroups | 67 |
| 4 | Comparison of mean values, standard deviations (SD) for epithelium thickness between 2Gy subgroups and control subgroups | 68 |
| 5 | Comparison of mean values, standard deviations (SD) for epithelium thickness between 4 Gy subgroups and control subgroups | 69 |
| 6 | Comparison of mean values, standard deviations (SD) for epithelium thickness between 6 Gy subgroups and control subgroups | 70 |
| 7 | Mean values, standard deviations (SD) for epithelium thickness recorded for experimental groups as function medication | 72 |
| 8 | Mean values, standard deviations (SD) for PCNA recorded for all groups as function of radiation and medication | 82 |
| 9 | Comparison of mean values, standard deviations (SD) for PCNA between control subgroups | 83 |