

**TABLE OF CONTENT**

|   | Page |
|---|------|
| FRONT COVER.....                              | i    |
| ENDORSEMENT FORM .....                        | ii   |
| DECLARATION .....                             | iii  |
| SUMMARY .....                                 | vi   |
| ABSTRACT.....                                 | viii |
| ACKNOWLEDGEMENT .....                         | ix   |
| TABLE OF CONTENTS.....                        | xi   |
| LIST OF TABLES .....                          | xiv  |
| LIST OF FIGURES .....                         | xv   |
| LIST OF APPENDICES .....                      | xvi  |
| ABBREVIATIONS AND SYMBOLS.....                | xvii |
| <br>  |      |
| CHAPTER 1 INTRODUCTION .....                  | 1    |
| 1.1. Background .....                         | 1    |
| 1.2. Problem Formulation .....                | 2    |
| 1.3. Theoretical Base.....                    | 3    |
| 1.4. Purpose of Research.....                 | 4    |
| 1.5. Benefit of Research.....                 | 4    |
| 1.5.1. Theoretical benefit .....              | 4    |
| 1.5.2. Practical benefit.....                 | 4    |
| 1.6. Hypothesis.....                          | 4    |
| <br>  |      |
| CHAPTER 2 LITERATURE REVIEW .....             | 5    |
| 2.1. Nicotine.....                            | 5    |
| 2.1.1. Nicotine absorption .....              | 5    |
| 2.1.2. Nicotine metabolism .....              | 6    |
| 2.1.3. Nicotine excretion .....               | 7    |
| 2.1.4. Nicotine induces oxidative stress..... | 7    |
| 2.2. Reactive Oxygen Species.....             | 8    |
| 2.2.1. Species of ROS .....                   | 8    |
| 2.2.2. ROS and tissue oxidation .....         | 9    |
| 2.2.3. ROS as biomarker .....                 | 9    |
| 2.3. Kidney.....                              | 9    |
| 2.3.1. Kidney anatomy and physiology .....    | 10   |
| 2.3.2. Kidney histology .....                 | 11   |
| 2.3.3. Kidney function .....                  | 11   |

|                                      |   |    |
|--------------------------------------|---|----|
| 2.3.4.                               | Nicotine damage in kidney .....                       | 12 |
| 2.4.                                 | Antioxidant .....                                     | 14 |
| 2.5.                                 | <i>Nigella sativa</i> .....                           | 15 |
| 2.5.1.                               | Morphology.....                                       | 15 |
| 2.5.2.                               | Antioxidative property of <i>Nigella sativa</i> ..... | 16 |
| CHAPTER 3 MATERIALS AND METHODS..... |   | 17 |
| 3.1.                                 | Research Design.....                                  | 17 |
| 3.2.                                 | Sample and Number of Samples.....                     | 17 |
| 3.2.1.                               | Sample.....   | 17 |
| 3.2.2.                               | Number of samples .....                               | 18 |
| 3.3.                                 | Variable Observed .....                               | 18 |
| 3.3.1.                               | Independent variable .....                            | 18 |
| 3.3.2.                               | Dependent variable .....                              | 18 |
| 3.3.3.                               | Controlled variable.....                              | 18 |
| 3.4.                                 | Definition of Operational Variable .....              | 18 |
| 3.4.1.                               | <i>Nigella sativa</i> extract .....                   | 18 |
| 3.4.2.                               | Renal damage score .....                              | 19 |
| 3.5.                                 | Ethical Clearance .....                               | 20 |
| 3.6.                                 | Location and Duration of Research .....               | 20 |
| 3.6.1.                               | Location of research.....                             | 20 |
| 3.6.2.                               | Duration of research.....                             | 20 |
| 3.7.                                 | Materials and Tools of Research.....                  | 21 |
| 3.7.1.                               | Experimental animal .....                             | 21 |
| 3.7.2.                               | Materials of research.....                            | 21 |
| 3.7.3.                               | Tools of research.....                                | 21 |
| 3.8.                                 | Research Procedure.....                               | 21 |
| 3.8.1.                               | <i>Nigella sativa</i> extraction .....                | 21 |
| 3.8.2.                               | Dose calculation.....                                 | 22 |
| 3.8.3.                               | Adaptation period.....                                | 22 |
| 3.8.4.                               | Treatment period.....                                 | 23 |
| 3.8.5.                               | Organ collection.....                                 | 23 |
| 3.8.6.                               | Histological slides production.....                   | 23 |
| 3.8.7.                               | Observation of kidney tissue.....                     | 24 |
| 3.9.                                 | Data Analysis .....                                   | 24 |
| 3.10.                                | Procedural Diagram .....                              | 25 |
| CHAPTER 4 RESEARCH RESULT.....       |   | 26 |
| 4.1.                                 | Glomerular Congestion .....                           | 27 |
| 4.2.                                 | Interstitial Congestion .....                         | 27 |
| 4.3.                                 | Bowman Space Dilatation .....                         | 28 |
| 4.4.                                 | Necrotic Tubular Cell .....                           | 28 |
| CHAPTER 5 DISCUSSION .....           |   | 33 |

|   |    |
|---|----|
| CHAPTER 6 CONCLUSION AND SUGGESTION ..... | 35 |
| 6.1. Conclusion .....                     | 35 |
| 6.2. Suggestion.....                      | 35 |
| REFERENCES .....                          | 36 |
| APPENDICES .....                          | 45 |