

**PESTICIDAL AND IMMUNOLOGICAL STUDIES OF  
SOME *BACILLUS THURINGIENSIS* ISOLATES**

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## ABSTRACT

**Hassan Mohamed Ebrahim Mohamed El-Saadany. Pesticidal and Immunological Studies of Some *Bacillus thuringiensis* Isolates.**

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*Bacillus thuringiensis* subsps. *kurstaki* and *entomocidus* (*Btk* and *Bte*) were tested to estimate the toxicity against ١<sup>st</sup>, ٢<sup>nd</sup> and ٣<sup>th</sup> instars larvae of *S. littoralis* and the safety on mammals. Bioassay of *Btk* and *Bte* were studied at concentrations ١٠<sup>٨</sup>, ١٠<sup>٧</sup>, ١٠<sup>٦</sup>, ١٠<sup>٥</sup> and ١٠<sup>٤</sup> spore/ml. Results revealed that the two tested strains had a great efficacy against larvae of *S. littoralis*, but *Btk* was more effective than *Bte* on the tested larvae. The LC<sub>٥٠</sub> values of *Btk* and *Bte* on the first instar larvae were ٢,١٧ x ١٠<sup>٥</sup> and ٧,٨٣ x ١٠<sup>٦</sup> spore/ml, respectively, while on the ٢<sup>nd</sup> instar were ٤,٦٩ x ١٠<sup>٦</sup> and ٣,١٧٩ x ١٠<sup>٩</sup> spore/ml, respectively. The highest LC<sub>٥٠</sub> values were recorded for the ٣<sup>th</sup> instar larvae as ١,٠٩ x ١٠<sup>١١</sup> and ٢,٧٧ x ١٠<sup>١٢</sup> spore/ml for the same strains, respectively. *Btk* and *Bte* were injected into albino rabbits at ١٠<sup>٦</sup> spore per rabbit to study immune response by using ELISA technique. The most antisera exhibited moderate titers of *Btk* and *Bte*. The inhibition activity were tested to determined antibody sensitivity. *Btk* antibody was higher sensitivity than *Bte* antibody in detection of antigen. Regarding the cross reactivity, using different antibodies raised against *Btk* and *Bte*. *Bte* spore gave cross reaction with antisera from *Btk*, likewise, *Btk* spores gave cross reaction with *Bte* antiserum. Subchronic toxicity tests were carried out on rats with *Btk* and *Bte* by oral administration in daily drinking water at ١٠<sup>٨</sup>, ١٠<sup>٧</sup> and ١٠<sup>٦</sup> spore/ml for ٩٠ days. All animals were observed frequently during the test period for mortality and clinical signs of disease or toxicity. No mortality, no difference in the behavior or the morphological examinations were found in the male and female rats treated with *Btk* and *Bte* at all concentrations. There were slight differences in body weight gained between treated and untreated male and female rats

at some period of the test. The weights of liver, kidney, spleen, heart, lung, brain and testis in treated male rats, were not affected at all tested rates of both strains of *Bt*, except a significant decrease in liver, kidney and heart weight at different concentrations of *Bte*. Data on treated female rats, indicated that the weights of liver, kidney, spleen, heart, lung and brain were not affected with *Bt* strains. On the other hand a significant increase was found in spleen weight at all rats of *Bte*. According to clinco-biochemical aspects such as, liver functions (e.g., ALT, AST, ALP, TP and ALB), ChE, kidney functions (e.g., Urea and Creatinine) and thyroid function (e.g.,  $T_4$  and  $T_3$ ), *Btk* and *Bte* produced a significant differences (increase or decrease) at some period of treatment and some concentrations of *Bt*. Specimens from liver, kidney and spleen of treated male and female rats treated were taken for examination by light microscopy and photographed. *Btk* and *Bte* showed mild effect and cellular immunity (activation of Kupffer cells) on liver. In addition, in the kidney, adverse effect (thickening of glomerular capillary basement membrane), albuminous material in Bowman's space and mild effect (atrophied glomerular capillary tubes) were recorded. Also, in the female rats treated with *Btk*, spleen tissue was less affected (the follicular blood vessels showed thickening of the wall). Lymphocytic depletion in the lymphoid follicles in the spleen of females was noticed with *Bte*. In addition, thickening of the blood vessel wall of follicular vessel and lymphocytic depletion in the lymphoid follicle were found in the spleen of male rats treated with *Bte*.

**Key Words:** *Bacillus thuringiensis*, *S. littoralis* toxicity, ELISA, pathogenicity, rats.

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# CONTENTS

| TITLE  | Page |
|--|------|
| LIST OF TABLES   | IV   |
| LIST OF FIGURES  | VII  |
| I – INTRODUCTION.....  |      |
| II - REVIEW OF LITERATURE.....   |      |
| 1-Toxicity of some <i>B. thuringiensis</i> isolates against some insects.      |      |
| -Immunological studies.....  |      |
| - - Immune response of mammalia to <i>Bt</i> .....                             |      |
| 2,2-Enzyme-Linked Immunosorbent Assay (ELISA) for <i>Bt</i> ...                |      |
| -Toxicity and Pathogenicity of <i>Bt</i> on mammalian.....                     |      |
| . - <i>Bacillus thuringiensis</i> receptors specificity.....                   |      |
| - Safety of <i>Bt</i> to mammals .....   |      |
| . - Effect of <i>Bt</i> and some chemicals on clinco–biochemical status.....   |      |
| 3.4-Pathogenicity and infectivity of <i>Bt</i> to mammals .....                |      |
| III - MATERIALS AND METHODS.....   |      |
| - <i>Bacillus thuringiensis</i> strains.....                                   |      |
| - Culture conditions of <i>Bt</i> .....  |      |
| - Bioassay experiments.....  |      |
| - Rearing of the cotton leaf worm <i>S. littoralis</i> .....                   |      |
| - larval treatments .....  |      |
| - Immunological studies.....   |      |
| 4,1-Immunization of rabbits.....   |      |
| 4,2-Enzyme- linked immunosorbentassay (ELISA) and competitive immunoassay..... |      |
| - Subchoronic toxicity ( - days) of <i>Bt</i> against rats.....                |      |
| - -Experimental Animals.....   |      |
| - -Animal treatments .....   |      |
| - -Observation of animals .....  |      |

|   |  |
|---|--|
| - Evaluation of results.....  |  |
| - - Clinico-biochemical analyses.....   |  |
| - - -Collection of plasma samples.....  |  |
| . Determination of plasma aminotransferase (ALT &AST)                                   |  |
| activity .....  |  |
| . Determination of plasma Alkaline Phosphatase (ALP)                                    |  |
| activity.....   |  |
| . Determination of plasma Acetylcholinesterase (AChE)                                   |  |
| activity.....   |  |
| . Determination of plasma Total Protein (T.P.)  |  |
| concentration.....  |  |
| . Determination of plasma Albumin (Alb.) concentration...                               |  |
| . Determination of plasma Urea concentration.....                                       |  |
| . Determination of plasma Creatinine concentration.....                                 |  |
| . Determination of plasma total thyroxine (T <sub>4</sub> ) and                         |  |
| triiodothyronine (T <sub>3</sub> ).....   |  |
| . Histopathological examinations.....   |  |
| -Statistical Analysis Procedures.....   |  |
| IV - RESULTS AND DISCUSSION.....  |  |
| -Bioassay of <i>B. thuringiensis</i> subsp. <i>kurstaki</i> and <i>B. thuringiensis</i> |  |
| subsp. <i>entomocidus</i> on larvae of the cotton leafworm, <i>S.</i>                   |  |
| <i>littoralis</i> .....   |  |
| -Immunological effects of <i>Bt</i> strains on albino white rabbits.....                |  |
| -Titration.....   |  |
| -Competitive inhibition studies.....  |  |
| -Subchronic toxicity of <i>Bt</i> ( <i>Btk</i> & <i>Bte</i> ) against rats .....        |  |
| -Influence on mortality, behavior and morphological aspects                             |  |
| . - Influence of <i>Btk</i> and <i>Bte</i> on body weights gain.....                    |  |
| - Influence of <i>Btk</i> and <i>Bte</i> on weights of the internal organs....          |  |
| - Effect of <i>Btk</i> and <i>Bte</i> on some selected biochemical aspects in           |  |
| male and female albino rats.....  |  |
| - <i>Bt</i> ( <i>Btk</i> & <i>Bte</i> )and liver function in female and male albino     |  |



|   |  |
|---|--|
| rats.....   |  |
| - Effect on ALT and AST activities.....   |  |
| -Effect on ALP activities.....  |  |
| -Effect on total protein (TP) and albumin (ALB)<br>concentration.. ..   |  |
| -Effect on ACh-E<br>activity.....   |  |
| -Effect of <i>Bt</i> on some kidney function parameters in albino<br>rats.....  |  |
| -Effect on urea level.....  |  |
| -Effect on creatinine level.....  |  |
| - <i>Bt</i> and thyroid function (thyroxine "T " and triiodo-<br>thyronine "T ") in male albino rats.....                             |  |
| -Histopathological changes on some internal organs of tested<br>rats with different concentrations of <i>Btk</i> and <i>Bte</i> ..... |  |
| -Liver.....   |  |
| -Kidney.....  |  |
| -Spleen.....  |  |
| V - SUMMARY AND CONCLUSION.....   |  |
| VI – REFERENCES.....  |  |
| VII- ARABIC SUMMARY.....  |  |

## List of Tables

| No.<br>of<br>Table | Titles  | Page |
|--------------------|---|------|
| ١                  | Corrected mortality percentages of the first, second and fourth instar larvae of <i>S. littoralis</i> fed on diet treated with different concentrations of <i>B. thuringiensis</i> isolates | ٤٥   |
| ٢                  | Toxicity regression line parameters of ١ <sup>st</sup> instar larvae of <i>S. littoralis</i> after treated with <i>Bt</i> . ....  | ٤٦   |
| ٣                  | Toxicity regression line parameters of ٢ <sup>nd</sup> instar larvae of <i>S. Littoralis</i> after treated with <i>Bt</i> . ....  | ٤٦   |
| ٤                  | Toxicity regression line parameters of ٤ <sup>th</sup> instar larvae of <i>S. littoralis</i> after treated with <i>Bt</i> . ....  | ٤٦   |
| ٥                  | Titration of different dilutions of <i>Btk</i> antibodies with different concentrations of <i>Btk</i> coating antigens. ....  | ٥٠   |
| ٦                  | Titration of different dilutions of <i>Bte</i> antibodies with different concentrations of <i>Bte</i> coating antigens.....   | ٥٠   |
| ٧                  | The competitive inhibition activity of <i>Btk</i> and <i>Bte</i> spores at concentration ١:٨٠٠ of Ab with ٢,٥ x ١٠ <sup>٦</sup> spore/ml as antigen.....                                    | ٥٤   |
| ٨                  | Effect of <i>Btk</i> and <i>Bte</i> on body weight gain (g) of female rats treated orally at daily interval for ٩٠ days.....  | ٥٩   |
| ٩                  | Effect of <i>Btk</i> and <i>Bte</i> on body weight gain (g) of male rats treated orally at daily interval for ٩٠ days.....  | ٦٠   |
| ١٠                 | Effect of <i>Btk</i> and <i>Bte</i> on organs weight (g/١٠٠g body weight) of female rats treated orally at daily interval for ٩٠ days.....  | ٦٣   |
| ١١                 | Effect of <i>Btk</i> and <i>Bte</i> on organs weight (g/١٠٠g body weight) of male rats treated orally at daily intervals for ٩٠ days.....   | ٦٣   |

|    |  |    |
|----|--|----|
| ١٢ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on alanine aminotransferase (ALT) activity in female albino rats (U/L).....   | ٦٩ |
| ١٣ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on alanine aminotransferase (ALT) activity in male albino rats (U/L).....     | ٦٩ |
| ١٤ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on aspartate aminotransferase (AST) activity in female albino rats (U/L)..... | ٧٠ |
| ١٥ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on aspartate aminotransferase (AST) activity in male albino rats (U/L).....   | ٧٠ |
| ١٦ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on alkaline phosphatase (ALP) activity in female albino rats (IU/L).....      | ٧٦ |
| ١٧ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on alkaline phosphatase (ALP) activity in male albino rats (IU/L).....        | ٧٦ |
| ١٨ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on total protein concentration in female albino rats (g/dl).....              | ٨٠ |
| ١٩ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on total protein concentration in male albino rats (g/dl).....                | ٨٠ |
| ٢٠ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on albumin concentration in female albino rats (g/dl).....                    | ٨١ |
| ٢١ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on albumin concentration in male albino rats (g/dl).....                      | ٨١ |
| ٢٢ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on choline esterase (Ch.E) activity in female                                 |    |

|    |  |     |
|----|--|-----|
|    | albino rats (U/L).....   | 87  |
| ۲۳ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on choline esterase (Ch.E) activity in male albino rats (U/L).....  | 87  |
| ۲۴ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on urea level concentration in female albino rats (mg/dl).....  | 93  |
| ۲۵ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on urea level concentration in male albino rats (mg/dl).....  | 93  |
| ۲۶ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on creatinine level concentration in female albino rats (mg/dl).....  | 94  |
| ۲۷ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on creatinine level concentration in male albino rats (mg/dl).....  | 94  |
| ۲۸ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on thyroxine (T <sub>4</sub> ) (μg/dl) and tri-iodothyronine (T <sub>3</sub> ) (ng/dl) concentration in female albino rats..... | 100 |
| ۲۹ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on thyroxine (T <sub>4</sub> ) (μg/dl) and tri-iodothyronine (T <sub>3</sub> ) (ng/dl) concentration in male albino rats.....   | 100 |

## List of Figures

| No.<br>of<br>Fig. | Titles  | Page |
|-------------------|---|------|
| ١                 | Corrected mortality percentages of the first, second and fourth instar larvae of <i>S. littoralis</i> fed on diet treated with different concentrations of <i>B. thuringiensis</i> isolates.....              | ٤٧   |
| ٢                 | Two-dimensional titration of different dilutions of <i>Btk</i> antibodies with different concentrations ( $١٠^٧$ , $١٠^٦$ , $١٠^٥$ , $١٠^٤$ , $١٠^٣$ and $١٠^٢$ spore/ml) of <i>Btk</i> coating antigens..... | ٥١   |
| ٣                 | Two-dimensional titration of different dilutions of <i>Bte</i> antibodies with different concentrations ( $١٠^٧$ , $١٠^٦$ , $١٠^٥$ , $١٠^٤$ , $١٠^٣$ and $١٠^٢$ spore/ml) of <i>Bte</i> coating antigens..... | ٥١   |
| ٤                 | ELISA inhibition curves for <i>Btk</i> antibodies (at ١: ٨٠٠ final dilution) with coating antigen <i>Btk</i> at concentration $٢,٥ \times ١٠^٦$ . the analyte was <i>Btk</i> spores. ....                     | ٥٥   |
| ٥                 | ELISA inhibition curves for <i>Bte</i> antibodies (at ١: ٨٠٠ final dilution) with coating antigen <i>Bte</i> at concentration $٢,٥ \times ١٠^٦$ . the analyte was <i>Bte</i> spores. ....                     | ٥٥   |
| ٦                 | ELISA inhibition curves for <i>Btk</i> antibodies (at ١: ٨٠٠ final dilution) with coating antigen <i>Btk</i> at concentration $٢,٥ \times ١٠^٦$ . the analyte was <i>Bte</i> spores.....                      | ٥٦   |
| ٧                 | ELISA inhibition curves for <i>Bte</i> antibodies (at ١: ٨٠٠ final dilution) with coating antigen <i>Bte</i> at concentration $٢,٥ \times ١٠^٦$ . the analyte was <i>Btk</i> spores.....                      | ٥٦   |
| ٨                 | Effect of <i>Btk</i> and <i>Bte</i> on body weight gain (g) of female and male rats treated orally at daily interval for ٩٠ days.....   | ٦١   |

|    |  |    |
|----|--|----|
| ٩  | Effect of <i>Btk</i> and <i>Bte</i> on organs weight (g/١٠٠g body weight) of female rats treated orally at daily interval for ٩٠ days. ....                  | ٦١ |
| ١٠ | Effect of <i>Btk</i> and <i>Bte</i> on organs weight (g/١٠٠g body weight) of female rats treated orally at daily interval for ٩٠ days.....                   | ٦٤ |
| ١١ | Effect of <i>Btk</i> and <i>Bte</i> on organs weight (g/١٠٠g body weight) of male rats treated orally at daily interval for ٩٠ days.....                     | ٦٤ |
| ١٢ | Effect of <i>Btk</i> and <i>Bte</i> on organs weight (g/١٠٠g body weight) of male rats treated orally at daily interval for ٩٠                               | ٦٥ |
| ١٣ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on alanine aminotransferase (ALT) activity in female albino rats (U/L).....   | ٧١ |
| ١٤ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on alanine aminotransferase (ALT) activity in male albino rats (U/L).....     | ٧٢ |
| ١٥ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on aspartate aminotransferase (AST) activity in female albino rats (U/L)..... | ٧٣ |
| ١٦ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on aspartate aminotransferase (AST) activity in male albino rats (U/L).....   | ٧٤ |
| ١٧ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on alkaline phosphatase (ALP) activity in female albino rats (IU/L) .....     | ٧٧ |
| ١٨ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on alkaline phosphatase (ALP) activity in male albino rats (IU/L).....        | ٧٨ |
| ١٩ | Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on total protein concentration in female albino rats                          |    |

|  |     |
|--|-----|
| (g/dl).....  | 82  |
| 20 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on total protein concentration in male albino rats (g/dl).                                       | 83  |
| 21 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on albumin concentration in female albino rats (g/dl)...   | 84  |
| 22 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on albumin concentration in male albino rats (g/dl).....   | 85  |
| 23 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on choline esterase (Ch.E) activity in female albino rats (U/L).....                             | 88  |
| 24 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on choline esterase (Ch.E) activity in male albino rats  | 89  |
| 25 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on urea level concentration in female albino rats (g/dl)..                                       | 90  |
| 26 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on urea level concentration in male albino rats (g/dl).....                                      | 96  |
| 27 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on creatinine level concentration in female albino rats (g/dl).....                              | 97  |
| 28 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on creatinine level concentration in male albino rats (g/dl).....                                | 98  |
| 29 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on thyroxine (T <sub>4</sub> ) concentration in female and male albino rats (μg/dl).....         | 101 |
| 30 Effect of treatment with different concentrations of <i>Btk</i> and <i>Bte</i> on tri-iodothyronine (T <sub>3</sub> ) concentration in female and male albino rats (ng/dl)..... | 101 |
| 31 Liver of control female group showing normal hepatic tissue (H&E stain X <sub>400</sub> ). ....   | 106 |
| 32 Liver of female treated with <i>Btk</i> (10 <sup>4</sup> ) showing vacular  |     |