**Ain Shams University**
**Faculty of Pharmacy**
**Microbiology & Immunology Dept.**

# "An *in vitro* study on the antagonistic activities of certain *Lactobacillus* species against some bacterial pathogens"

**A Thesis**

Submitted in Partial Fulfillment of the Requirments for the

**Master's Degree**

In
Pharmaceutical Sciences
**(Microbiology and Immunology)**

*By*

**Doaa Mohamed Osama AbdulMonem Saleh**

Bachelor of Pharmaceutical Sciences,
Faculty of Pharmacy, Ain Shams University, 2010

**2017**

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والحمد لله كما ينبغي لجلال وجهه وعظيم سلطانه.

*Doaa Mohamed Osama*

# LIST OF ABBREVIATIONS

| Abbreviation | Definition |
|---|---|
| AAD | Antibiotic-associated diarrhea |
| ACE | angiotensin converting enzyme |
| AD | Atopic dermatitis |
| AI | Autoinducer |
| ANOVA | Analysis of variance |
| ATCC | American type culture collection |
| BCG | Bacillus Calmette-Guerin |
| BHI broth | Brain heart infusion broth |
| CDAD | *Clostridium difficile* associated diarrhea |
| CFS | Cell free culture supernatant |
| CFU | Colony forming unit |
| CLR | C-type lectin receptors |
| CRC | Colorectal cancer |
| CT | Computed tomography |
| CV | Crystal violet |
| CYP | Cytochrome P 450 |
| DCs | Dendritic cells |
| DSM | German Collection of Microorganisms |
| EHEC | Enterohemorrhagic *Escherichia coli* |
| ELISA | Enzyme linked immunosorbent assay |
| EPEC | Enteropathogenic *Escherichia coli* |
| EPS | Exopolysaccharides |
| FAO | Food & Agriculture Organization of the United Nation |
| FDA | Food and drug administration |
| HCAs | Heterocyclic amines |
| HDL | High density lipoproteins |
| IBD | Inflammatory bowel diseases |
| IFN-γ | Interferon gamma |
| IL | Interleukin |
| LDL | Low density lipoproteins |
| LGG | *Lactobacillus rhamnosus* GG (ATCC 53103); GG derived from the first letters of Goldin and Gorbach |

| Abbreviation | Definition |
|---|---|
| LPxTG | Leucine-Proline-x-Threonine-Glycine; x means any amino acid |
| LTA | Lipoteichoic acids |
| MH | Mueller Hinton agar |
| MHC | Major histocompatibility complex |
| MOI | Multiplicity of infection |
| MRS | de Man Rogosa and Sharpe |
| MRSA | Methicillin resistant *Staphylococcus aureus* |
| MSA | Mannitol salt agar |
| NCFS | Neutralized cell free supernatant |
| NCTC | National collection of type cultures (UK) |
| NEC | Necrotizing enterocolitis |
| NF-κB | Nuclear factor kappa B |
| NIH | National Institutes of Health of the US |
| NLR | Nucleotide oligomerisation receptors |
| NPPC | p-Nitrophenylphosphorylcholine |
| PAMPs | Pathogen associated molecular patterns |
| PBMC | Peripheral blood mononuclear cells |
| PBS | Phosphate buffered saline |
| PG | Peptidoglycans |
| PLC | Phospholipase C |
| PPAR-γ | Peroxisome proliferator-activated receptor gamma |
| QS | Quorum sensing |
| RAM | riboflavin assay medium |
| RLR | RIG-1 like receptors |
| ROS | Reactive oxygen species |
| RPMI | Roswell Park Memorial Institute |
| SDP | Sortase dependent proteins |
| SEM | Scanning electron microscopy |
| S-layer proteins | Paracrystalline surface layer proteins |
| STEC | Shiga toxin-producing *Escherichia coli* |
| Stx | Shiga toxins |
| TCA | Trichloroacetic acid |

| Abbreviation | Definition |
|---|---|
| TGF-β | Transforming growth factor β |
| TLR | Toll-like receptors |
| TNF-α | Tumour necrosis factor alpha |
| $T_{reg}$ | Regulatory T-cells |
| WHO | World health organization |
| WTA | Wall teichoic acids |

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