

Anti-infective potential of castor oil and ricinoleic acid against selected human-pathogenic bacteria

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Castor oil (CO) and Ricinoleic acid (RA) were evaluated for their anti-infective activity against four different human-pathogenic bacteria, employing the nematode worm *Caenorhabditis elegans* as a model host. *In vitro* assays to study interaction of these two items with test bacteria with respect to bacterial growth, quorum-regulated pigment production, biofilm formation, and few other clinically relevant traits were also performed.

CO and RA were procured from CDH and Sigma-Aldrich respectively. Methodology of the *in vitro* and *in vivo* assays was adopted from our previous publications (Joshi et al., 2019; Patel et al., 2019), which also contains details of the organisms used.

Results explaining effect of CO and RA are presented through Figures 1-15, which indicate CO and RA both to be capable of attenuating virulence of pathogenic bacteria. Latter exerted activity at concentrations much lesser than that of CO. While major observations are mentioned below, full details of this study can be seen in Biswas et al. (2018).

CO (0.5-2%v/v) could attenuate virulence of three of the test bacteria by 25-56%. It could enhance susceptibility of all the four pathogens to lysis in presence of human serum upto 20-39%. CO could eradicate pre-formed *P. aeruginosa* biofilm by 30%. Neither *P. aeruginosa* nor *S. aureus* could develop complete resistance to CO even after repeated exposure to this plant oil. CO was able to modulate quorum-regulated pigment production in all the three multidrug-resistant gram-negative bacteria used in this study. Antibiotic susceptibility of all the test pathogens was modulated upon CO-treatment.

RA (1-20 µg/mL) could attenuate virulence of all the three gram-negative pathogens by 4-63%. Even repeated exposure of *P. aeruginosa* or *S. marcescens* to RA did not induce complete resistance in these pathogens. Susceptibility of three of the test pathogens to lysis in presence of human serum was enhanced upon RA-treatment by 21-77%. Haemolytic potential of *P. aeruginosa* and *C. violaceum* was curbed upto 23-41% as a result of RA-pretreatment. Production of quorum-modulated pigment in all four test pathogens was modulated under influence of RA. Antibiotic susceptibility of all the four pathogens was also modulated as a result of RA-treatment.

As RA seemed to exert anti-pathogenic potential at concentrations lower than that of CO, and since it has been known to be a constituent of CO (Paul et al., 2016); RA can be said to be largely (not necessarily solely) responsible for the anti-infective potential of CO.

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Table of Contents Selected Papers On The Pathogenic Ricket

1. Understanding the eBook Selected Papers On The Pathogenic Ricket
 - The Rise of Digital Reading Selected Papers On The Pathogenic Ricket
 - Advantages of eBooks Over Traditional Books
2. Identifying Selected Papers On The Pathogenic Ricket
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Selected Papers On The Pathogenic Ricket
 - User-Friendly Interface
4. Exploring eBook Recommendations from Selected Papers On The Pathogenic Ricket
 - Personalized Recommendations
 - Selected Papers On The Pathogenic Ricket User Reviews and Ratings
 - Selected Papers On The Pathogenic Ricket and Bestseller Lists
5. Accessing Selected Papers On The Pathogenic Ricket Free and Paid eBooks
 - Selected Papers On The Pathogenic Ricket Public Domain eBooks
 - Selected Papers On The Pathogenic Ricket eBook Subscription Services
 - Selected Papers On The Pathogenic Ricket Budget-Friendly Options

6. Navigating Selected Papers On The Pathogenic Ricket eBook Formats
 - ePub, PDF, MOBI, and More
 - Selected Papers On The Pathogenic Ricket Compatibility with Devices
 - Selected Papers On The Pathogenic Ricket Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Selected Papers On The Pathogenic Ricket
 - Highlighting and Note-Taking Selected Papers On The Pathogenic Ricket
 - Interactive Elements Selected Papers On The Pathogenic Ricket
8. Staying Engaged with Selected Papers On The Pathogenic Ricket
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Selected Papers On The Pathogenic Ricket
9. Balancing eBooks and Physical Books Selected Papers On The Pathogenic Ricket
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Selected Papers On The Pathogenic Ricket
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Selected Papers On The Pathogenic Ricket
 - Setting Reading Goals Selected Papers On The Pathogenic Ricket
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Selected Papers On The Pathogenic Ricket
 - Fact-Checking eBook Content of Selected Papers On The Pathogenic Ricket
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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