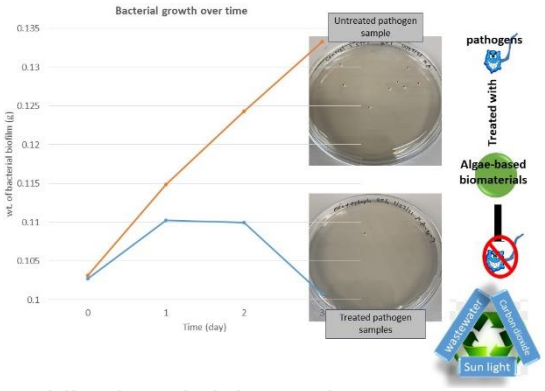
The Role of Microbial Biomaterials on Drug-Resistant pathogens

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Abstract

Statement of the Problem: The most common endocrine disease in the United States is the diabetes. Most of diabetic patients experienced wound infections. The speed of the infection and the intensive increase of drug-resistant pathogens highlighted the need for new therapeutic strategies. The purpose of this study is to investigate the inhibition effects of algae-based biomaterials on the growth of the pathogenic strain *Staphylococcus aureus* in suspension- and biofilm-based cultures. Methodology & Theoretical Orientation: First, a pure culture of *Microcystis aeruginosa* was mixed with pathogenic culture. Second, the algae-based biomaterials were extracted from pure culture of *Microcystis aeruginosa* and applied on *Staphylococcus aureus* biofilm for 24, 48, and 72 hours. The growth of the pathogen was monitored daily and measured as Colony-forming units (CFU) per ml. Then, the extracted biomaterials were characterized for their shape, size using the TEM and the Nano analyzer, respectively. Findings: The growth of *Staphylococcus aureus* was significantly inhibited because of treatments compared to control samples. The inhibition effect of the extracted biomaterials was dose depended. The extracted biomaterials have circular to oval shaped with 100 nm size. Conclusion & Significance: Algae-based biomaterials significantly reduced the growth of the tested drug-resistant pathogen. This novel green strategy provides the opportunity to assess wound infections for diabetics in vivo and open the area for friendly-environmental products. The current antibiotics-related drugs possess multiple problems such as 1) their inability to totally inhibit the growth of drug-resistant bacteria, 2) they are expensive because most are synthetic products, and 3) they can be toxic when discharged into the environment. As a result, these natural products will be of interest to the research and industrial communities because it overcomes the challenges of known antibiotics.

Image



Recent Publications (minimum 5)

1. Saad, M.G., Beyenal, H. and Dong, W.J., 2021. Exosomes as Powerful Engines in Cancer: Isolation, Characterization and Detection Techniques. Biosensors, 11(12), p.518.
2. Saad, M.G., Schonna R.. M., and Dong, W.J, 2021. The reduction and inhibition of drug-resistance bacteria by sulfated polysaccharides released from *Porphyridium purpureum* UTEX LB 2757 (Rhodophyta)". Published poster at the 75th Annual Meeting of the Phycological Society of America that held virtually in July 2021.
3. Marwa Gamal Saad, Noura S. Dosoky, Mohamed Shafick Zoromba, Laila Mekki, Magdy El-Bana, David Nobles, Schonna Manning, Amirali Selahi and Hesham Mohamed Shafik, A droplet-based gradient microfluidic to monitor and evaluate the growth of *Chlorella vulgaris* under different levels of nitrogen and temperatures, Algal Research 2019, 44, 101657.
4. Saad, M.G.; Dosoky, N.S.; Khan, M.S.; Zoromba, M.S.; Mekki, L.; El-Bana, M.; Nobles, D.; Shafik, H.M. High-Throughput Screening of *Chlorella Vulgaris* Growth Kinetics inside a Droplet-Based Microfluidic Device under Irradiance and Nitrate Stress Conditions. Biomolecules 2019, 9, 276. doi: 10.3390/biom9070276
5. Marwa G. Saad, Noura S. Dosody, Mohamed S. Zoromba, Hesham M. Shafik, Algal Biofuels: Current Status and Key Challenges (review), Energies 2019; 12(10): 1920.



Biography

Marwa Gamal Saad is a PhD candidate at the Voiland College of Engineering and Architecture, Washington State University. Mrs. Saad is working on novel antibiotics from microorganisms for drug-resistant bacteria. She received a Bachelor of Science in Botany and a master's degree in Biotechnology from the Botany Department, at the Science Faculty. Her research interest areas are Biotechnology, Microbiology, Genetics, Nanotechnology, and Renewable Energy. She is a reviewer for multiple peer-reviewed journals such as Algal Research and Frontiers in Bioscience. She is a member of the Phycological Society of America, and the International Society of Phycology. Previously, she was a research leader for several student projects. In that position, she was responsible for strategic plans and development for project success. She has good experience in algal culturing and manipulation for purposes of economic algal production.

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