Interaction between probiotics and skin pathogens within the host

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The skin is an ecosystem which frequently interconnects with the outer environment and colonized with a vast number of different microorganisms. These microbial groups are associated with human health and disease. Skin and soft tissue infections (SSTIs) are the infections caused as a result of the microbial invasion of the skin layers and underlying soft tissues. They vary from mild to severe infections. The prolonged appliance of antibiotics can expand the incidence of antibiotic resistance. This has led to the necessity to find a safe long-term alternative treatment for infectious diseases. Many studies have exposed the promising advantages of probiotics in both prevention and treatment of diseases. Probiotic bacteria have many valuable properties to repress the growth of pathogenic microorganisms. Members of the genus *Lactobacillus* are one of the most common probiotics used in fermented and non-fermented dairy products. Animal studies were successfully demonstrated in using the wax moth larvae *Galleria mellonella* as a model to investigate host-pathogen interactions. This project aimed to explore both the *in vitro* antagonistic activity and *in vivo* protective effect of food isolated *Lactobacillus* species against two of the major causes of skin infections: *Staphylococcus aureus*, *Streptococcus pyogenes*. Pathogenic bacteria were isolated from skin infections' patients. *Lactobacillus* species were isolated from fermented food products. Bacterial biodiversity of food samples was evaluated by culture-independent method (16S rRNA gene meta-analysis). Antibacterial activity of *Lactobacillus* on the pathogens was assessed by an overlay assay. To determine the numbers of both *Lactobacillus* and pathogenic isolates, several serial dilutions of bacterial washed cells were injected inside the larvae individually in triplicates. To evaluate the therapeutic potential of *Lactobacillus* against the pathogens and depending on the larval survival percentages, two doses of *Lactobacillus* bacterial cells were injected in the larvae after the injection of several doses of each pathogen. Two *Lactobacillus* species: *Lb. delbrueckii* and *Lb. plantarum* were isolated from food samples (yogurt and olives) inoculated in MRS broth and incubated under anaerobic conditions. However, culture-independent method of these samples inoculated in the same medium and incubated under the same conditions showed an abundance of 0.8% for the first species and no abundance for the second species in the extracted genomic DNA. All lactobacilli revealed the maximum antagonism after 72h under anaerobic conditions. Injection of both *Lactobacillus* species in a dose of 103 – 104 CFU/larvae showed 80% - 100% larval survival. *Strept*. *pyogenes* was more virulent to the larvae than *Staph aureus*. When compared with the control groups, low dose of one of the *Lactobacillus* species has a protective activity against the infection caused by *Strept pyogenes*. It can be concluded that food lactobacilli have an adequate therapeutic potency against skin pathogens used in the study.

Speaker Biography

Duaa S Al-Dulaimy is currently pursuing her PhD in Cardiff University, UK. She has completed her BSc degree from Department of Biology/ School of Biosciences, Mustansiriyah University, Iraq and her MSc degree from the same department. She has published several papers in reputable journals and has been working as a lecturer for more than ten years teaching the undergraduate students of medical microbiology and biotechnology. And, she has supervised several undergraduate students.

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