

3 OBJECTIVES

The present work focuses on bacteriophage therapy for multidrug resistance bacterial infections in burn wounds to overcome antimicrobial drug resistance by preparing bacteriophage microparticles and incorporating them into a gel. The specific objectives are:

1. To isolate and characterize bacteriophage against *A. baumannii*, *K. pneumoniae*, *P. aeruginosa*, and *S. aureus*.
2. To prepare bacteriophages loaded microparticles-laden topical gel for the treatment of multidrug-resistant biofilm-mediated burn wound infection caused by mono-species (*A. baumannii* or *K. pneumoniae*) and polybacterial infection (*S. aureus* with *P. aeruginosa*).
3. To determine the antibacterial, and antibiofilm efficacy of bacteriophage formulation against multidrug-resistant biofilm-mediated burn wound infection caused by mono-species (*A. baumannii* or *K. pneumoniae*) and polybacterial infection (*S. aureus* with *P. aeruginosa*).
4. To evaluate *in vivo* wound healing potency of bacteriophage microgel

PLAN OF WORK

- 1. Bacterial strain collection and identification of resistance strain**
- 2. Isolation of bacteriophage**
- 3. Characterization of bacteriophage**
 - Bacteriophage host specificity
 - Morphological class identification of phages
 - Bacteriophage quantification
 - One plus growth curve
 - UV, pH, and temperature stability of bacteriophage

4. Bacteriophage microparticle-laden gel preparation

5. Characterization of developed formulation

- Particle size, polydispersity index, and zeta potential
- Entrapment efficiency
- Gel organoleptic appearance, spreadability, and viscosity characterization
- Release study of bacteriophages
- Stability study of formulation

6. Antibacterial and antibiofilm study

- Minimum inhibitory concentration and minimum bactericidal concentration
- Microtiter plate antibiofilm assay
- Scanning electron microscopy of biofilm
- Atomic force microscopy of poly bacterial biofilm

7. Animal study

- *In vivo* burn wound healing study
- Ultrasound and Photoacoustic imaging study
- Histopathological analysis