ISOLATION AND CHARACTERIZATION OF BACTERIOPHAGE AGAINST MULTI DRUG RESISTANT STAPHYLOCOCCI OF ANIMAL ORIGIN

ABSTRACT

Key words: Lytic bacteriophage, MDR-Staphylococci, Podoviridae, SEM, TEM, Genetic characterization, Host range, Plaque assay, One-step growth curve

The present study was undertaken with an aim of isolation and characterisation of a lytic bacteriophage against multi drug resistant staphylococci from animal origin. The lytic bacteriophage was isolated from sewage source, enriched with specific MDR Staphylococci, concentrated and purified using PEG precipitation techniques. The phage morphology, structure and stability were characterised using electron microscopy (SEM & TEM) and other physicochemical methods. Genetic nature of the bacteriophage and its proteins were evaluated through molecular techniques. The phage (vB_SaP-AZ2) belonged to family Podoviridae with icosahedron head with diameter 86 nm and a non-contractile tail measuring about 36 nm in length. The replication strategy was elucidated through one-step growth curve experiment. The latent period was observed to be of 90 minutes and burst size of 93. The thermo-stability of phage was observed to be up to 45°C, higher temperatures resulted in progressive inactivation. The phage was stable in pH range of 6-8. UV exposure for 1 hr and chloroform treatment for 24 hrs did not affect the phage stability. Genetic nature of phage was observed to be dsDNA with restriction sites of NdeI and HindIII. Genome length of phage was observed to be >15kbp and <20kbp. The host range of phage was determined by plaque assay. The phage had lytic activity against 52.5% of clinical isolates of Staphylococcus spp. whereas it was effective against 73.33% of MRS isolates in-vitro. Lytic activity was observed even on biofilm producing MRSA. The potential therapeutic use of lytic bacteriophage would be more conclusive with further clinical trials.