ABSTRACT

Failure of antibiotics to combat drug-resistant microorganisms is a major contributing factor to the rise of multidrug-resistant *Enterococci*, particularly *Enterococcus faecalis*. In nosocomial settings, vancomycin-resistant *Enterococcus faecalis* (VRE) has become a major threat. As a result, alternative treatments are more important than ever. Bacteriophage (phage) therapy is often proposed as a potential alternative therapy for bacterial infections. Recent clinical uses of bacteriophage treatments have attracted worldwide attention, mainly used as rescue therapy for near-fatal antibiotic failures. In the present thesis, a multi-drug resistant (MDR) *E. faecalis* strain was isolated from a urine sample. The identity, biochemical characterization, and antibiotic susceptibility testing were done via partial 16S rRNA gene sequencing and the VITEK®2 system, respectively. Two virulent phages were isolated from sewage water against the MDR *E. faecalis* strain. Both phages demonstrated a shorter latent period and a larger burst size than most regular-tailed phages, indicating that ZT1 and SA14 are effective against the clinical isolate. Therefore, it is extremely important to use clinically relevant in-vivo models, which present both short and long-term consequences of phage therapy for fulminant infections as emergency situations. In this study, the therapeutic effectiveness of phage therapy as a rescue treatment for severe septic endocarditis and wound infection in a mouse model was assessed by different multiplicities of infection (MOIs) from a lytic bacteriophage (ZT1). The intraperitoneal (IP) injection of 10^9 CFU/ml of one of these VRE strains was utilized to cause bacteremia in mice. The bacteremia that resulted was deadly within 48 hours. A single IP injection of 3 x10^8 PFU/ml of the phage strain, given 60 min after the bacterial challenge, was sufficient to save all of the animals. A single dose (IP injection) of the bacteriophage ZT1 was enough to completely reverse the trend of 100% mortality caused by the VRE, resulting in a significant improvement in the clinical condition.

Keywords:

Enterococci, Bacteriophage, Vancomycin-resistance *Enterococcus faecalis, in vivo* wound mice model, Genome anal