THERAPEUTIC POTENTIAL OF BACTERIOPHAGE ISOLATED FROM SEWAGE FOR MULTIDRUG RESISTANT ESCHERICHIA COLI INFECTION IN MICE

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ABSTRACT

Bacteriophages are bacteria-specific viruses that infect and destroy their host bacteria. More recent attempts to use bacteriophages as therapeutic agents in both humans and animals have been applied with some success to treat a wide variety of antibiotic resistant pathogens. However, there is limited study on phage isolation and their therapeutic potential against multi-drug resistant pathogen in Ethiopia. Therefore, this study was conducted to isolate and evaluate therapeutic potentials of bactriophages against multi-drug resistant *E.coli*. Bacteriophage samples were collected from makelle dairy farm sewage and inoculated on active *E.coli* broth culture. After amplification of the phage, it was isolated on *E.coli* culture grown on tyreptic soy agar. Therapeutic potential of the isolated phage for multidrug resistant Escherichia coli were examined in mice. In this study, bacteriophage having ability of lysing *E.coli* was isolated. The isolated phage has rescued 83.3 % of the mice infected with multi-drug resistant *E.coli* when administered just after infection. The result indicated that the isolated phage has effect against multi-drug resistant *E.coli*. Thus the isolated phage might be used as potential therapeutic alternatives to antibiotics in human and animals after further study.

Key words: *Bacteriophage, E.coli, Multi -drug resistance; therapy; sewage*

1. INTRODUCTION

Bacteriophages are the most ubiquitous known organisms on Earth. They are found every- where and their isolation is not expensive. Sewage is known to contain in the range of 10^8–10^{10} phage/ml. Therapeutic phages have advantages over antibiotics. Example, phages minimize damage to normal flora through their limited host range; resistance to phages is neither global nor transferrable when compared to antibiotics and the isolation of a new phage is relatively fast and cheap compared to the discovery of a new antibiotics. The emergence of bacterial resistance to antibiotics following wide spread clinical, veterinary, and animal or agricultural usage has made antibiotics less and less effective.

Objectives:

- To isolate bacteriophage specific to Escherichia coli from sewage
- To examine the therapeutic potential of the isolated phage for multidrug resistant Escherichia coli infection in mice

METHODS

E.coli was isolated from cow with diarrhea using standard bacterial isolation techniques. Antimicrobial sensitivity test on isolated *E.coli* was done using disc diffusion method. Bacteriophage was isolated from sewage samples. Sewage were filtered and inoculated on overnight incubated *E.coli* culture in tryptic soy broth. The amplified phage and *E.coli* were inoculated on eosin methylene blue agar for isolation. The plates were observed for the presence of plaques formation which indicated the successful isolation of the bacteriophage. To determine the therapeutic potential of the isolated phages, in vivo studies was done on mice.

RESULTS

Escherichia.coli was isolated and identified from clinical sample. The isolated *E.coli* was resistant to Polymyxin, Amoxcycillin, and Clindamycin. Bacteriophage having the ability of lysing E.coli was isolated successfully. 5 out of 6 mice (83.3%) survived *E.coli* infection in experimental group receiving phage therapy immediately after bacterial infection. However 100% (6/6) of the mice were dead in the group that did not get phage therapy. It also found that there was significance difference in survival of mice between treated and control group (*P=0.009*) (Table).

Table: Result of phage therapy in mice infected with multi- drug resistant *E.coli*

Group	*ROI*	*Number*	*Death within 24H*	*Survived*	*Survived (%)*	*P-value*
Treated	i.p	6	1	5	83.3	
Treated after 2H	i.p	6	2	4	66.6	0.009
Control	i.p	6	6	0	0	

CONCLUSION AND RECOMMENDATION

Bacteriophage having ability of lysing *E.coli* was successfully isolated. The isolated phage has rescued 83.3 % of the mice infected with multi-drug resistant *E.coli* when administered just after infection. The result indicated that the isolated phage has effect against multi-drug resistant *E.coli*. Thus the isolated phage might be used as potential therapeutic alternatives to antibiotics in human and animals after further study.