



## Bacteriophage as a therapeutic agent against bacterial infection

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### Abstract

Bacteriophages are among the most widely recognized and diverse elements in biosphere. Phage therapy have colossal job for polymicrobial against biofilm contaminations alongside assortment of microorganisms. Microbes have a sort of insusceptible framework that decimates the genetic material of some infiltrating phages can overcome this invulnerable framework. The adequacy of phages should be tried in a lab preceding use in the treatment. Phage treatment is considerably more explicit than anti-infection agents. They are normally innocuous not exclusively to the host life form yet in addition to other valuable microbes, for example, the gut vegetation decreasing the odds of crafty diseases. Phages are as of now being utilized restoratively to treat bacterial diseases.

**Keywords:** bacteriophage, staphylococcus aureus, spot test

### Introduction

Bacteriophage is bioactive operators which are innocuous infections which contaminate and recreate inside microscopic organisms. Bacteriophage has cardinal job in treating bacterial diseases which causes high mortality around the world. Bacteriophage has key job in multidrug opposition microscopic organisms. The bacteriophage term was gotten from microbes and Greek word phagien – "To eat up". Bacteriophage are unavoidable, they are found in soil or digestive organs of creatures and furthermore ocean water. Bacteriophage are among the most widely recognized and diverse substances in biosphere. It has been assessed that there are in excess of 100 diverse phage species and no less than 10 phage for every bacterium. Bacteriophage is pervasive infections found wherever microscopic organisms exist. It is assessed there are in excess of 1031 bacteriophage on planet more than each other living being on earth including microscopic organisms and joined. Bacteriophage includes proteins that epitomize the DNA or RNA genome and may have moderately simples or elaborate structure. Bacteriophage molecule or virion comprise of single or twofold stranded (ss or ds) DNA or RNA particle, typified inside protein or lipoprotein coat. Genome measure phage fluctuates from couple of thousands of bp upto 498 kbp in phage G. The measure of phage head is related to genome estimate being pressed and different in width between 45-100 nm.

Bacteriophage groups diverse life cycle inside its bacterial host for example Harmful and a virulent. Destructive is said in light of the fact that bacteriophage use microscopic organisms as sub-atomic hardware for arrival of offspring virion cause lysis of microbes. A virulent or calm phages are those which utilize lysogenic life cycle and coordinate their genome with host bacterial genome repeating synchronously with no cell lysis. Bacterial protection from anti-infection agents is a major issue in traditional measurements structure which can be overwhelmed by bacteriophage. Phage therapy have gigantic job for poly microbial against biofilm contaminations alongside assortment of microscopic organisms. Microbes have a kind of insusceptible

framework that crushes the inherited material of some entering phages can vanquish this resistant framework. The viability of phages should be tried in a lab preceding use in the treatment. Phage treatment is substantially more explicit than anti-microbial. They are normally innocuous not exclusively to the host living being yet in addition to other helpful microbes, for example, the gut greenery diminishing the odds of artful contaminations. Bacteriophage has a high helpful record that is phage treatment would be relied upon to offer ascent to few reactions. Since phage repeat in vivo (in cell of living life form) a littler viable portion can be utilized. Phage will possibly execute a bacterium on the off chance that it is match to explicit strains. Phages will in general be more fruitful than anti-infection agents where there is a biofilm secured by a polysaccharide layer which anti-toxins regularly can't enter. In the west no treatments are right now approved for use on people, in spite of the fact that phages for slaughtering nourishment harming bacteria (*Listeria*) are currently being used. Phages are right now being utilized remedially to treat bacterial diseases that don't react to regular anti-microbial especially in Russia and Georgia. There is additionally phage treatment unit in Wroclaw Poland, built up 2005, just such focus in an European association nation. Phage treatment is called biocontrol if target host of phage treatment isn't a creature. Phage treatment has numerous potential applications in human medications just as dentistry, veterinary science and farming.

### Materials and Methods

#### Material

Nutrient agar is procured from Hi, media laboratories pvt. Ltd Zinc chloride procured from research lab fine chemist. *Staphylococcus aureus* procured from college laboratory.

#### Method Of preparation of bacteriophage

##### Phage preparation by zinc chloride

Suspension of *staphylococcus aureus* in liquid broth, (tryptophan 10 microgram/liter, yeast extract 5gm/liter, NaCl 5gm/ liter,) were incubated at 37°C for 30 min. in

presence of increasing conc. of  $ZnCl_2$ . Concentration is given as below.

**Table 1**

	I	II	III	IV	V	VI	VII	VIII	IX	
ZnCl <sub>2</sub> ml	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
SPPI	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5

After centrifugation (8000rpm, 2min) phages present in pellets were separated by pour out the supernatant & bacteriophage collected as pellets by nichrome wire loop.

**Evaluation Parameter**

**Double layer agar overlay technique**

100 micro liter of filtered suspension of each dilution add to 1ml of 6 hr. incubated staphylococcus aureus to this add 3ml nutrient agar then transfer to agar medium plate. Activity of bacteriophage test sample I to IV for were seen.

**Spot test**

10 microlitre of each phase lysine dropped on lawn of fresh bacterial suspension in soft nutrient agar plate. Bacteriophage activity was evaluated on test solution of I to VII.

**Result and discussion**

Following test are performed on bacteriophage for 10 dilutions as follows.

**Double layer agar overlay technique**

Out of 10 sample of bacteriophages presence of phages were seen by 4 sample by inhibition of growth of microorganism which clearly seen by naked eyes.

**Spot test**

According to spot test results, it clearly specifies that in 8 sample growth of microorganism inhibited which indicated that presence of bacteriophages.



**Fig 1: Sample I**



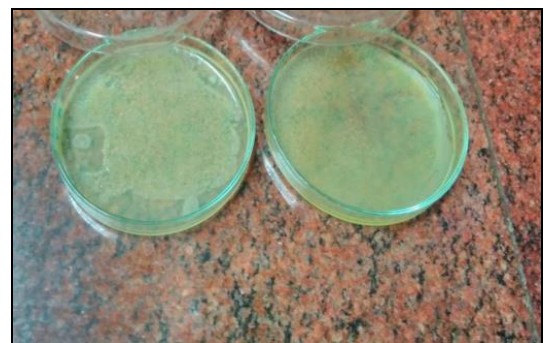
**Fig 2: Sample II**



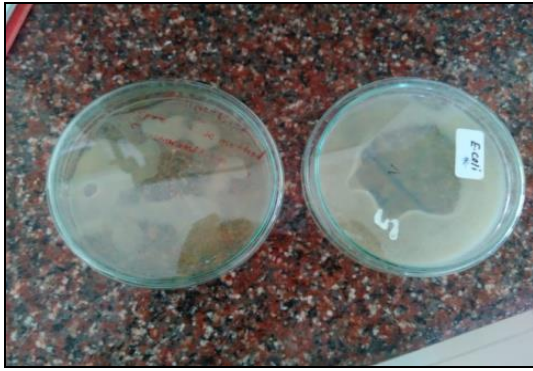
**Fig 3: Sample III**



**Fig 4: Sample IV**



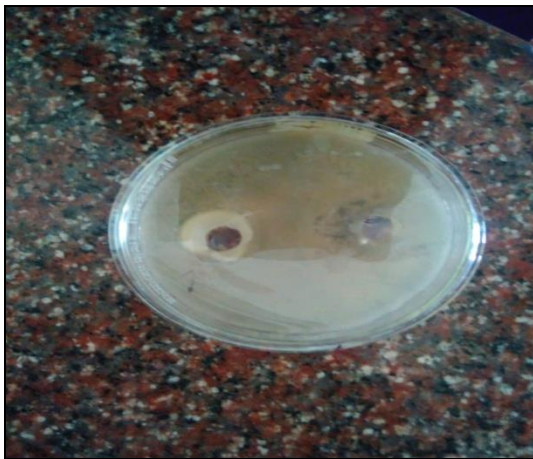
**Fig 5: Sample V & VI**



**Fig 6:** Sample VII & VIII

#### Diffusion method

Test sample VII, VIII, IX consist of 0.7, 0.8, 0.9 ZnCl<sub>2</sub>. And 3.5, 4.0, 4.5 ml of SPPI. Respectively. Zone of inhibition shown by this sample is diameter of 2.3, 1.7, 1.8 cm respectively. Out of this sample X shows greater zone of inhibition.



**Fig 7:** Sample no I

#### Conclusion

In summary, bacteriophage has several characteristics that make them potentially attractive therapeutic agent. This article will show recently identified and characterization phage which shows bacteriophage activity against strains of E coli. The spot test activity shown by phage will arise in promising treatment method. Perhaps we shall have yet to learn about some features of microorganism, however there is sufficient data and enough need to find alternative treatment modalities against rapidly emerging antibiotic resistance bacteria to provide further studies in field of phage therapy

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