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A study on bacteriophage therapy and its significance

[1] Mailare Havgirao V, [2] Aravind Kumar Sharma

[1] Research Scholar OPJS University Churu Raj, Rajasthan, India.
[2] Assistant Professor Department of Computer Science OPJS University Churu. Rajasthan, India

Abstract
Bacteriophages are very harmful for the bacteria as they can attack on them and may harm their process of metabolism. Klebsiella and E. Coli bacteria are very infection prone and they may cause many problems for the skin. To treat these problems, Bacteriophage therapy is used. The current article describes about the method of bacteriophage therapy. Infections are spread over a certain area so as to kill the bacteria. It is found that there is no side-effect of this kind of therapy method. *Klebsiella species can be found in any type of flora, fauna and animals etc.* They are existed anywhere due to the process of sublineages mounting which are related to the biochemical adaptations for meticulous surroundings.

Keywords: *Klebsiella species*, Bactriophages, Bacteria

Introduction

The shape of Klebsiella bacteria is found to be more rounder and thicker as compared to other members of Enter obacteriaceae species. The i.e. end points are also in a round shape and they transpire as verticle sticks. They can be seen in chains, group or single. The suitable temperature for their growth is observed to be between 35 and 37 ^{0}c and at pH of 7.2. Laborartory media is the best option for them to grow as there is no explicit escalation necessities.

Capsules can be produced form these species. Its members can also be used to generate other products like glop sheet for serologic recognition which can be replaced by the technique of molecular stereotyping.

Klebsiella genus can be used as pathogens and they are normally found in human organs like mouth, nose and gastrointestinal territory in the form of ordinary vegetation. They are also responsible in destroying other animal's diversity either it could be flora or pathogens.

Klebsiella organisms may cause many harmful diseases like diarrhea, tissue infections, pneumonia and urinary tract infections etc. It is also observed that in most of the cases, the bacteria like K. pneumonia and K. oxytoca are responsible for human Klebsiella infections. It is also observed that these infections are mostly found in the people between the age group of 18 to 45.

From the last decade, the scientists are in the process of making K. Pneumoniae vaccines. At present, there is no Klebsiella vaccine available which can prevent the human beings from infections. It is also found that the bacteria K. pneumonia is responsible for the infections such as urinary tract infections.

There are many bacterial pathogens which are acquired by the hospitals and the most used pathogen is drug-resistant isolates and these isolates are found in medical departments like exhaustive care units. Generally, multidrug efflux pumps are provided with this antimicrobial confrontation.

The main reason for K. pneumoniae to be so harmful is the fact that they have the ability to clear up the hospital situation by compromising with various surfaces with the addition of skin of patients and hospital administration.

Plants are also supposed to be a good source of *Klebsiella*. *K. pneumoniae* and *K. oxytoca* are very beneficial for the plants as the former has the capability to fix atmospheric nitrogen into a revised version which can easily be absorbed by the plants. The bacteria attach strongly to plant's root and less firmly to the core of the area of elongation and the root cap mucilage. These are also good option for the farmers and agriculture as they have the capability to increase the level of production of crop with the specified agricultural conditions.

Deficiency of a flagellum can be found in plants having a number of bacteria, *Klebsiella*. *K. pneumoniae* and *K. oxytoca. K. variicola* bactria is generally found in plants such as sugarcane and banana trees etc.

Bactriophages have the ability of lyzing the pathogenic bacteria and hence, they are also popular as the therapeutic agents which can easily adopt to any situation.

Table 4: Phage therapy trials

Infection	Causative agent	Summary
Suppurative skin infection	*E. coli, Klebsiella, Proteus, Pseudomonas, Stapylococcus*	of 31 patients 23 cases at least had a marked improvement
Various	*E. coli, Klebsiella, Proteus, Pseudomonas, Stapylococcus*	phage immunogenicity did not hinder therapy
Gastrointestinal, head, neck, skin	*E. coli, Klebsiella, Pseudomonas, Salmonella, Staphylococcus*	506/550 patients (92%) successfully treated
Suppurative infection	*Staphylococcus*, Gram-negative	oral administration; 56 patients successfully treated, phage in blood (47/56) and in urine (9/56)
Brucellosis	Brucella abortus	
Conjunctivitis, dermatitis, pharyngitis, rhinitis	*Enterococcus, E. coli, P. aeruginosa, Staphylococcus, Streptococcus*	1340 patients treated; 360 with phage (86% clinical improvement), 404 with antibiotics (48% clinical improvement) and 576 with combination (83% clinical improvment)

The main advantage of using bactereotherapy over antibiotics is that the former is easy to produce and it has no side-effects. *Klebsiella* is also found in food as coliform. Till now, there is no strong media to detect the presence of *Klebsiella* in the food materials. *Klebsiella* can contaminate the food and can cause for the food borne diseases.

Research Plan

The rate of mounting confrontation against phages can be partly circulated by using various phages in one preparation. Most prominently, when resistance against a given phage generates, it should be probable to choose quickly a new phage active against the phage-resistant bacteria.

Phages move into the bloodstream within two to four hours and that they are found in the interior organs in approximately ten hours. Also, data relating to the perseverance of administered phages point to that phages can stay in the human body for comparatively a long period of time.

During this activity, the phages produce a number of copies of themselves and attack on the host cell. It is observed that all the phages do not replicate in the same number.

Since bacterial phage is a typical phage, it is probable that a number of phages act with the help of a comparable cascade; however, it is also probable that some therapeutic phages have some inimitable yet anonymous species accountable for their capacity to efficiently attack their target bacteria.

In another research, a distinctive method has been adopted for shielding phage DNA from the restriction-modification resistance of an *S. aureus* host strain. Further elucidation of these and similar mechanisms is likely to yield information helpful for hereditarily engineering optimally efficient therapeutic phage arrangements.

Results

In the phage-treated group, the weight loss rate (weight difference before infection and 24 h after infection/weight before infection) was significantly lower. In the homogenate of lungs, the number of bacteria (log^{10} CFU g^{-1}) in phage group and control group was, respectively, 6.16 ± 0.10 and 7.99±0.10 so the number of bacteria was approximately two log units lower than that in the control group. The number of bacteriophage (log^{10} PFU g^{-1}) in phage group and control group was, respectively 6.48±0.11and 7.76 ± 0.11 so the number of phage was more than 10 times higher in the treatment group.

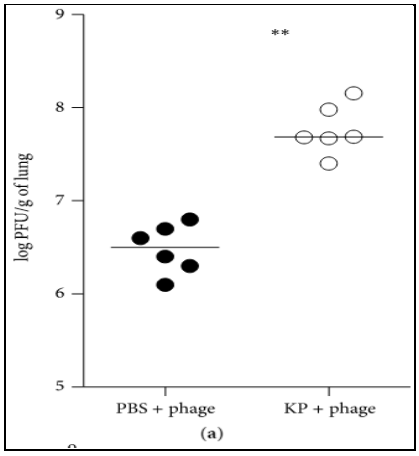

Fig 1

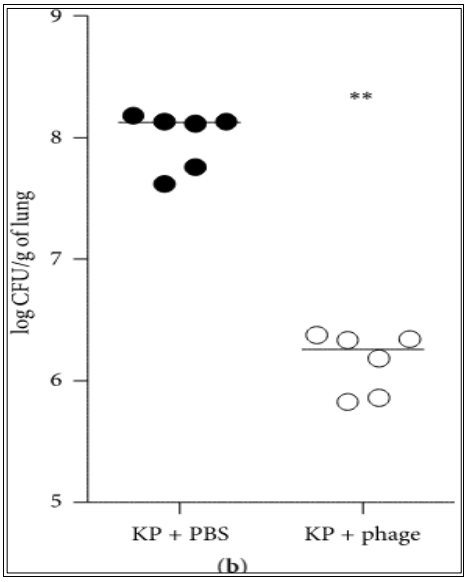

Fig 2

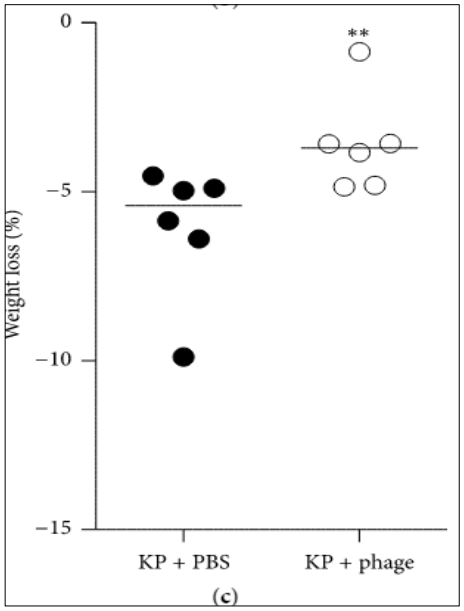

Fig 3

Conclusion

Hospital-acquired pneumonia that is caused by Klebsiella pneumoniae is always a threat as well as a fastidious public, human health problem. Despite advances in antimicrobial therapy, the morbidity and mortality remain high and out of control.

Furthermore, the emergence of multidrug resistance aggravates this situation. An increasing number of extended-spectrum-β-lactamase-producing and KPC-type carbapenemases-producing K. pneumoniae nosocomial isolates have been reported.

Since antibiotic treatment has associated restrictions and shortcomings, phage therapy is now more frequently being considered as a potential treatment and prevention for bacterial infections.

The in vitro study showed phage 1513's effectiveness against K. pneumoniae with a short latent time and a large burst size. In addition, the phage possessed stability within

physiological ranges of temperature and pH. It formed plagues on 5 of 10 clinical Klebsiella strains tested, notably KP 1513.

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