



Therapeutic Potentials of Phage Therapy against Bacterial Co-Infections in Parasitic Disease

Vikram Ghosh*

Department of Laboratory Medicine and Pathobiology, University of Toronto, Toronto, Canada

DESCRIPTION

Parasitic diseases remain a significant global health concern, often leading to severe morbidity and mortality. The World Health Organization (WHO) estimates that billions of people are affected by various parasitic infections, such as malaria, schistosomiasis, and leishmaniasis. A complicating factor in the management of these diseases is the occurrence of bacterial co-infections, which can exacerbate symptoms, prolong recovery, and complicate treatment regimens. Traditional antimicrobial therapies may be ineffective against these bacterial pathogens due to antibiotic resistance, leading researchers to explore alternative therapeutic strategies, such as phage therapy.

Understanding phage therapy

Phage therapy involves the use of bacteriophages—viruses that specifically infect and lyse bacteria—to treat bacterial infections. Unlike broad-spectrum antibiotics, phages target specific bacterial strains, minimizing collateral damage to beneficial microbiota. This specificity not only reduces side effects but also diminishes the risk of developing antibiotic resistance. The renewed interest in phage therapy stems from its potential to combat multidrug-resistant bacteria, a growing concern in clinical settings.

Bacterial co-infections in parasitic diseases

Bacterial co-infections can significantly impact the course and outcome of parasitic diseases. For example, individuals infected with *Plasmodium*, the causative agent of malaria, may develop secondary bacterial infections, such as pneumonia or skin infections, due to immunosuppression. These bacterial infections can complicate the clinical picture, leading to increased morbidity and potentially fatal outcomes. Similarly, schistosomiasis is associated with bacterial infections that may arise from skin lesions or compromised immune function.

The presence of co-infections not only complicates treatment but also leads to poorer prognoses. Traditional treatments often rely on antibiotics, which may be less effective due to resistance patterns in bacterial populations. Furthermore, the overuse of antibiotics

in treating these infections can lead to a cycle of resistance, further complicating management strategies.

Phage therapy: A targeted approach

Phage therapy offers a promising avenue to address bacterial co-infections in the context of parasitic diseases. One significant advantage of phage therapy is its ability to specifically target pathogenic bacteria responsible for secondary infections, leaving non-pathogenic flora intact. This targeted approach can be particularly beneficial in immunocompromised patients, such as those suffering from parasitic infections.

Research has demonstrated the efficacy of phages against various bacterial strains. For instance, studies have shown that phage preparations can effectively reduce bacterial loads in animal models of co-infection. In the case of malaria, phage therapy targeting *Streptococcus pneumoniae* has shown promise in reducing secondary infections, thereby improving clinical outcomes. Such studies underscore the potential of integrating phage therapy into existing treatment protocols for parasitic diseases complicated by bacterial infections.

Synergy with conventional therapies

Phage therapy can be used in conjunction with conventional treatments for parasitic infections, enhancing overall therapeutic outcomes. By reducing the burden of bacterial co-infections, phages can improve the effectiveness of antiparasitic drugs. For instance, in cases of malaria, the clearance of secondary bacterial infections could enhance the efficacy of antimalarial agents, leading to faster recovery and reduced morbidity.

Moreover, the combination of phage therapy with immunomodulatory treatments could further strengthen patient outcomes. Given that parasitic infections often lead to altered immune responses, integrating phage therapy may help restore a more balanced immune environment, improving the body's ability to fight both the parasite and co-infecting bacteria.

Correspondence to: Vikram Ghosh, Department of Laboratory Medicine and Pathobiology, University of Toronto, Toronto, Canada; E-mail: Vikrghosh@gmail.com

Received: 24-Oct-2024, Manuscript No. JBP-24-27261; **Editor assigned:** 25-Oct-2024, PreQC No. JBP-24-27261 (PQ); **Reviewed:** 08-Nov-2024, QC No. JBP-24-27261; **Revised:** 14-Oct-2025, Manuscript No. JBP-24-27261 (R); **Published:** 21-Oct-2025, DOI: 10.35248/2155-9597.25.16.511

Citation: Ghosh V (2025) Therapeutic Potentials of Phage Therapy against Bacterial Co-Infections in Parasitic Disease. *J Bacteriol Parasitol*. 16:511.

Copyright: © 2025 Ghosh V. This is an open-access article distributed under the terms of the creative commons attribution license which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Challenges and considerations

Despite the promising therapeutic potential of phage therapy, several challenges must be addressed before widespread clinical implementation. The production and purification of phage preparations can be complex and time-consuming. Additionally, the potential for bacterial resistance to phages, while less common than with antibiotics, is still a concern. The co-evolution of phages and their bacterial hosts may necessitate the development of phage cocktails that can adapt to changing bacterial populations.

Regulatory hurdles also pose challenges to the advancement of phage therapy. In many countries, phage therapy is still considered an experimental treatment, and obtaining approval for clinical use can be lengthy and complicated. Therefore, ongoing research, clinical trials, and regulatory efforts are crucial to establish standardized protocols and safety guidelines for phage therapy.

Future directions

The future of phage therapy in the context of parasitic diseases and bacterial co-infections is promising. Advances in genomic and proteomic technologies may facilitate the identification of specific phages with therapeutic potential against resistant bacterial strains. Additionally, personalized phage therapy—tailored to the individual's specific bacterial flora—could enhance treatment efficacy.

Collaboration between microbiologists, parasitologists, and clinicians will be essential in further exploring the synergistic potential of phage therapy. Integrating phage therapy into standard treatment protocols for parasitic diseases could transform the management of bacterial co-infections, offering a novel strategy in the ongoing battle against antimicrobial resistance.

CONCLUSION

Phage therapy holds significant promise as a targeted approach to managing bacterial co-infections in parasitic diseases. By addressing the limitations of traditional antibiotic treatments, phage therapy may enhance patient outcomes, reduce morbidity, and combat the growing challenge of antibiotic resistance. As research continues to unfold, the integration of phage therapy into clinical practice may pave the way for innovative treatment strategies that effectively address the complexities of co-infections in parasitic diseases.