

BACTERIOPHAGE THERAPY: BRIDGING KNOWLEDGE AND PERCEPTIONS AMONG HEALTHCARE PROFESSIONALS - A CROSS-SECTIONAL STUDY

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ABSTRACT

In the face of mounting antibiotic resistance, bacteriophage therapy had shown promise as an alternative treatment. However, the extent of awareness and acceptance among healthcare professionals was previously unclear. This study sought to assess the understanding and viewpoints of doctors and Pharm.D. participants. This cross-sectional study was conducted among healthcare professionals in September 2023. Participants from various locations were recruited through WhatsApp groups for a geographically diverse sample. A validated survey with closed-ended questions and demographic information was used. Data analysis encompassed the use of descriptive statistics and chi-squared tests to assess associations and trends in participants' responses. A total of 125 doctors and Pharm.D. students were surveyed to assess their knowledge, perceptions, and awareness of bacteriophage applications. The findings indicate substantial familiarity with bacteriophages among respondents, with a notable majority aware of bacteriophage therapy as an alternative to antibiotics ($P = 0.018$). In summary, despite acknowledging the advantages and benefits of bacteriophage therapy, its practical application remains constrained. Widespread recognition of its potential in healthcare and the expressed interest in research collaboration underscore the crucial necessity of narrowing the gap between awareness and implementation.

Keywords: Bacteriophage, Bacteriophage therapy, Healthcare, Knowledge, Awareness, Implementation.

INTRODUCTION

Antibiotic resistance has become a critical global health issue, rendering many conventional antibiotics ineffective and creating an urgent need for alternative treatments. Bacteriophage therapy, which employs viruses that specifically infect and lyse bacterial cells, has emerged as a promising solution. This therapy, discovered over a century ago, has gained renewed attention for its potential to combat antibiotic-resistant infections¹. Bacteriophages, or phages, are found ubiquitously in nature and possess a high degree of specificity for their bacterial hosts, making them an effective tool for targeting pathogenic bacteria while preserving beneficial microbiota². Despite their potential, the integration of phage therapy into mainstream clinical practice has been slow. This delay is due to regulatory hurdles, the necessity for extensive research to ensure safety and efficacy, and a lack of awareness and acceptance among healthcare professionals³.

Recent studies have shown an increasing interest in bacteriophage therapy, especially in countries heavily impacted by antibiotic resistance⁴. However, the knowledge and willingness to adopt this therapy among healthcare professionals, including doctors and Pharm.D. students, is poorly understood. This study assesses healthcare professional's views on bacteriophage therapy to identify barriers and promote its clinical integration.

MATERIALS AND METHODS

This cross-sectional observational study was conducted to evaluate the knowledge and perceptions of healthcare professionals regarding bacteriophage therapy. The target population included doctors, clinical pharmacists, Pharm.D. interns, and students. Participants were recruited over a one-month period in September 2023. Data collection was performed using a validated survey questionnaire that included closed-ended questions and demographic information.

. Participants were recruited in September 2023 from various locations through WhatsApp groups managed by the authors, ensuring a diverse and geographically dispersed sample. Data were collected using an online survey distributed via WhatsApp groups. The questionnaire, specifically designed for this study, included sections on demographic information, knowledge about bacteriophage therapy, and perceptions regarding its clinical use. The survey guaranteed anonymity and voluntary participation, aiming to capture a wide range of responses from various healthcare settings. The data were analysed using SPSS version 26.0. Descriptive statistical methods were employed to concisely summarize the demographic characteristics and survey responses. The chi-squared test was used to assess associations and trends in participants' knowledge and perceptions. A 'P' value of <0.05 (95% confidence interval) was deemed statistically significant.

RESULTS & DISCUSSION

In a recent study involving 125 participants, which included doctors and Pharm.D. students, findings highlighted a notable 60% awareness of bacteriophage therapy as a treatment for bacterial infections ($P = 0.018$), although only 11% reported utilizing bacteriophages in their clinical practice. Detailed findings are presented in Table 1. This suggests a considerable gap between awareness and practical implementation in healthcare settings.

These results underscore existing literature, indicating a trend of increasing awareness but limited adoption of bacteriophage therapy due to various barriers.

Regarding awareness, previous studies have similarly observed growing knowledge about bacteriophage therapy among healthcare professionals, yet significant educational deficiencies persist, hindering broader acceptance and utilization^{4,5}. The current study's findings of 60% awareness reflect these educational gaps and underscore the need for enhanced educational efforts.

The low implementation rate of 11% is corroborated by studies that have identified regulatory complexities and the absence of standardized protocols as substantial barriers to the clinical application of bacteriophage therapy⁶. These findings align with

the current research, emphasizing the regulatory challenges and logistical barriers that impede widespread adoption of bacteriophage treatments. (Figure. 1)

Perceptions of effectiveness among those aware of bacteriophage therapy were positive, which aligns with clinical studies showing successful outcomes in treating antibiotic-resistant infections. Studies have reported promising results with bacteriophage therapies, reinforcing the potential benefits recognized by informed healthcare professionals⁷. This positive perception is crucial for promoting wider acceptance and usage in clinical settings. (Figure. 1)

The identified barriers—lack of education, regulatory challenges, and availability issues—are extensively documented in the literature. Authors have highlighted the necessity for improved education and streamlined regulatory processes to facilitate the integration of bacteriophage therapy into clinical practice^{4,8}. Studies have stressed the importance of developing robust infrastructure for phage production and administration to address practical challenges⁹.

Furthermore, the study indicated strong support (84%) for collaborative efforts between clinicians and researchers, echoing sentiments expressed in previous research. These collaborative initiatives are critical for overcoming current barriers and advancing the effective utilization of bacteriophage therapy¹⁰.

This study has several limitations. The limited number of participants in the study and its narrow geographic scope might not accurately reflect the larger population of healthcare professionals, potentially impacting its applicability to a wider context. The utilization of self-reported data presents potential biases, notably stemming from social desirability and recall bias.

Additionally, the cross-sectional design captures a single point in time, not accounting for changes in awareness and usage over time. The study also did not explore detailed reasons behind identified barriers, such as specific regulatory challenges or educational gaps.

Future research should address these limitations for a more comprehensive understanding of the factors influencing bacteriophage therapy adoption and perception.

CONCLUSION

This study highlights a moderate awareness of bacteriophage therapy among healthcare professionals but reveals a significant gap in its clinical application, with only 11% having used it. Despite positive perceptions of its efficacy, major barriers such as lack of education, regulatory hurdles, and availability issues impede broader adoption. These findings underscore the need for targeted educational initiatives, streamlined regulatory frameworks, and enhanced collaboration between clinicians and researchers. Addressing these challenges is essential for harnessing the potential of bacteriophage therapy to combat antibiotic-resistant infections and improve patient outcomes. Future efforts should focus on overcoming these obstacles to integrate bacteriophage therapy into mainstream medical practice effectively.

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Figure. 1 Exhibiting limited usage (11%) of bacteriophage therapy in clinical practices.

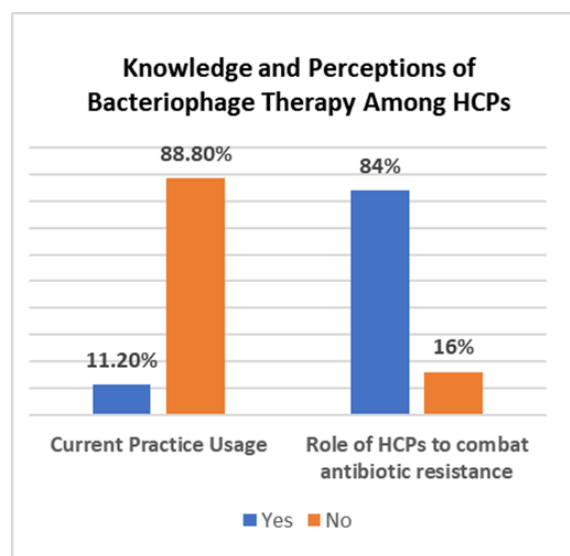


Table 1: Summary of Survey Results on Bacteriophage Applications

Parameters		n (%)	P - Value	
Total No. of Participants		125	-	
Age	Under 25	37 (29.6%)	-	
	25 – 34	23 (18.4 %)		
	35 – 44	12 (9.6%)		
	45 – 54	35 (28.0%)		
	55 or older	18 (14.4%)		
Gender	Male	69 (55.2%)	-	
	Female	56 (44.8%)		
Profession	Pharm. D	44 (35.2%)	-	
	Physician	81 (64.8%)		
Awareness of bacteriophage therapy among healthcare professionals	Pharm. D	Yes	18 (14.4%)	0.018
		No	26 (20.8%)	
	Physician	Yes	51 (40.8%)	
		No	30 (24%)	
Survey Questionnaire				
How familiar are you with bacteriophages?	Very Familiar	27 (21.6%)	-	
	Somewhat Familiar	81 (64.8%)		
	Not Familiar	17 (13.6%)		
Have you heard of bacteriophage therapy as an alternative to antibiotics?	Yes	69 (55.2%)	-	
	No	56 (44.8%)		
Are you aware that bacteriophages are used in managing infections?	Yes	75 (60.0%)	-	
	No	50 (40.0%)		
Do you think bacteriophages have a role in controlling bacterial infections in healthcare settings?	Yes	104 (83.2%)	-	
	No	21 (16.8%)		
What do you perceive as the potential benefits of bacteriophage therapy over antibiotics?	Faster Recovery	17 (13.6%)	-	
	Fewer Side Effects	17 (13.6%)		
	Targeted Treatment	85 (68.0%)		
	Not Sure	6 (4.8%)		
In your current practice or studies, have you ever used bacteriophages for any purpose?	Yes	14 (11.2%)	-	
	No	111 (88.8%)		
Do you think bacteriophages play role in antimicrobial resistance?	Yes	95 (76.0%)	-	
	No	30 (24.0%)		
Would you be interested in collaborating on research projects related to bacteriophages?	Yes	105 (84.0%)	-	
	No	20 (16.0%)		

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