Isolation and characterization of a bacteriophage that hosts on Avian-pathogenic Escherichia coli (APEC)

Haya Fakhouri[1], Orjowan Juneidi[1], Hanaa Mohtaseb[1], Murad Ishnaiwer[2*], Fawzi Al-Razem[3]

Applied Biology Program, Faculty of Applied Sciences, Palestine Polytechnic University, Hebron, Palestine

Abstract (300 word limit)

Infectious Colibacillosis disease caused by Avian-pathogenic Escherichia coli (APEC) commonly threatens poultry flocks worldwide. It limits productivity and causes severe economic losses to poultry sector.

In addition, the emergence of multidrug resistance among APEC is an increasing concern since these resistant bacteria can infect humans and develop mechanisms that enable them to resist the commonly used antibiotics. The use of phages in treating pathogenic bacteria is considered a possible alternative to the conventional use of antibiotics. This study describes the isolation and characterization of a bacteriophage with broad lytic spectra against the APEC E. coli. It was isolated using soft agar overlay method and through monitoring the formation of clear zones on a lawn culture of APEC host bacterium. The isolated phage apparently has a small genome size and with small number of multiple copies of same proteins as revealed by SDS-PAGE. The quantification of infectious viruses in bacterial suspension was further determined through a one-step growth curve analysis using double layer test. It revealed a latent period of about 24 h, burst period of 70 h and a burst size of about 24×103 plaque forming units (PFU) per infected cell. The host range of the bacteriophage was determined by performing spot tests with four APEC bacterial strains. The phage was capable of lysing all tested strains, an indicative of wide host range for this isolated bacteriophage. We conclude that bacteriophages can be used to eliminate or reduce the scope of APEC infection in poultry and possibly used as an alternative to antibiotics.

Keywords: APEC E. coli, Bacteriophages, Colibacillosis, Plaque forming unit

Image

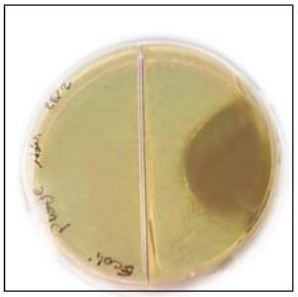


Figure 1.Bacterial cultures on LB agar plates showing bacteriophage lysis. Phage filtrate (10 µL) was added to each bacterial plate PPU3. Lysis appeared as a clear yellow circle at the right side. The left side is a control with the host bacteria, but with no phage added.

Recent Publications (minimum 5)

1. Harper, D.R. and M.C. Enright (2011) Bacteriophages for the treatment of Pseudomonas aeruginosa infections. Journal of applied microbiology 111:1-7.
2. Ishnaiwer, M.M and F. Al-Razem (2013) Isolation and Characterization of Bacteriophages from Laban Jameed. Food and nutrition sciences 4: 56-66.
3. Jahantigh, M., R.E. Dizaji (2015) Antimicrobial Drug Resistance Pattern of Escherichia coli Isolated from Chickens Farms with Colibacillosis Infection. Open Journal of Medical Microbiology 5: 159-162.
4. Jamalludeen, N., Y.M. She, E. J. Lingohr and M. Griffiths (2009) Isolation and characterization of virulent bacteriophages against Escherichia coli serogroupsO1, O2, and O78. Poultry Science 88: 1694–1702.
5. Janež, N and C. Loc-Carrillo (2013) Use of phages to control Campylobacter spp. Journal of Microbiological Methods 95:68-75.



Biography (150 word limit)

Murad Ishnaiwer is an instructor of Microbiology and Virology at Palestine Polytechnic University, he is an expertise in isolation and characterization of viruses that eat bacteria called bacteriophages. He obtained master of Biotechnology, and also was trained in stem cells and cell transduction at Bon university in Germany.

Email:
mishnaiwer@ppu.edu

Notes/Comments: