ABSTRACT

Salmonella is one of the prime causes of food borne diseases. *Salmonella enterica* serovar Typhi and Paratyphi cause typhoid and paratyphoid fever, respectively. Both diseases spread through contaminated food and water. With the advent of phage targeted research in recent times, and with the numerous success stories from *in vitro* research and clinical trials, bacteriophages seen to be a good candidate to be used as a Biocontrol agent against pathogens which are antimicrobial resistant and have the potential to replace antimicrobials in the near future. A single phage against *S.* Typhi, *S.* Paratyphi A, B and C each were isolated and characterized. TEM and endonuclease assays revealed that 3 of the phages were double stranded DNA viruses from the family Myoviridae and one was a single stranded DNA virus from the family Inoviridae. The phages were stable at -20 to 60°C and pH 3 – 9. Next generation sequencing and bio-informatics analysis gave a detailed understanding of the phage genes. Genome analysis of the *S.* Typhi phage and *S.* Paratyphi phage showed the size of each genome to be 197215 bp and 250739 bp respectively. A total of 206 protein encoding genes were identified in case of *S.* Typhi phage out of which 43 were functional proteins whereas in case of *S.* Paratyphi A phage a total of 207 protein encoding genes were identified out of which 49 were functional proteins. A total G+C content of 49.34% was seen in case of *S.* Typhi phage and 49.54% in case of *S.* Paratyphi A phage. Primary annotation of the phage genomes show the presence of structural proteins (virion structural protein 7, tail-associated protein, tail fibre protein, major capsid protein), DNA synthesis enzymes (acetyltransferase, DNA-directed RNA polymerase beta' subunit, nuclease SbcCD D subunit, GNAT family acetyltransferase, thymidylate kinase, transcriptional regulator etc.) and lysin (endolysin). In the biocontrol study, it was shown that phages that were added to *Salmonella*-

spiked chicken meat samples, either as a single type or as a cocktail of 2 phage types, significantly reduced the population of the bacteria by 2 to 3 logs at 4°C and 25°C. However, the cocktail reduced the number of *Salmonella* by 3 logs in a shorter time compared to single type phage. The results demonstrated that bacteriophage cocktail treatment has the prospective to be developed as an alternate approach to eliminate *Salmonella* contamination in chicken meat samples.