

From Invasion to Infection: A Review of Understanding *Salmonella* Pathogenic Mechanism

Sufi Afrina Tay Binti Muhammad Alif Iskandar^a, Sharifah Aminah Syed Mohamad^{a*}

Structured Abstract

Background: It has been established that Salmonellosis is an acute infection that can spread to humans and animals caused by one of the world's most common foodborne pathogens, *Salmonella*. *Salmonella*-related infections are becoming more widespread even in today's world. Common illnesses like gastroenteritis and diarrhoea have created serious problems for the world's health. A new medicinal approach must be developed to guarantee sufficient treatment because the bacterium's annual mortality rate is increasing. Nevertheless, the specific mechanisms facilitating adhesion and invasion of *Salmonella* remain unknown. The molecular principles behind these medical conditions, as well as the ineffectiveness of antibiotics in curing infection, are still vague and undetermined. Hence, this review article aims to highlight the mechanism of invasion and pathogenicity of *Salmonella* for better future development of *Salmonella* treatment and management. Furthermore, this review discusses how these mechanisms maintain the infection persistence of *Salmonella* and the development of antimicrobial resistance strains.

Methods: A comprehensive research review was conducted to address the identified research gaps focusing on peer-reviewed journals from specific databases such as Google Scholar, ScienceDirect, and Scopus that were published from 2020 to 2024 for gathering relevant information and potential solutions.

Results: Emerging research indicates that the most significant virulence factor of *Salmonella* is the TolC protein due to its important role in regulating virulence genes. *Salmonella* employs the TolC-dependent efflux mechanism for pathogenicity, which plays a crucial role not only in the adhesion and invasion of host cells but also contributes to the antimicrobial resistance (AMR) of *Salmonella*.

Conclusion: In conclusion, the study was focused on the interaction between the virulence factors of *Salmonella* and the human immune system through an assessment review from online literature and thus calls for novel approaches against AMR and *Salmonella* infection for the improvement of the public health outcome. Addressing the molecular pathway is critical for further research about the crucial host-pathogen interactions that determine the persistence of bacterial infections, which may also aid in reducing the bacterial population while preventing transmission of the disease.

Keywords: *Salmonella*, virulence, *Salmonella* pathogenicity, antimicrobial resistance, antibiotics

*Correspondence: sharifah459@uitm.edu.my

^a School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia