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Generation of genetically inactivated *Salmonella Gallinarum* ghost and evaluation of its potential as an effective inactivated vaccine candidate against fowl typhoid

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Fowl typhoid (FT), a septicemic disease of poultry, causes acute mortality and induces severe inflammation of internal organs such as liver and spleen, caecum and yolk sac which results in significant economic losses to the poultry industry worldwide. FT is caused by facultative intracellular Gram-negative bacterium, *Salmonella* enterica serovar Gallinarum (SG). Bacterial ghost (BG) technology has been a new and progressive approach to construct the safe and immunogenic inactivated vaccines against wide variety of infectious diseases. In order to develop a novel, safe and immunogenic fowl typhoid (FT) vaccine candidate, a *Salmonella* Gallinarum ghost with controlled expression of the bacteriophage PhiX174 lysis gene Ewas constructed. The formation of the *Salmonella* Gallinarum ghost with tunnel formation and loss of cytoplasmic contents was observed by scanning electron microscopy and transmission electron microscopy. No viable cells were detectable 24 h after the induction of gene E expression by an increase in temperature from 37°C to 42°C. The safety and protective efficacy of the *Salmonella* Gallinarum ghost vaccine was tested in chickens. None of the immunized animals showed any adverse reactions such as abnormal behavior, mortality, or signs of FT such as anorexia, depression, or diarrhea. Immunization with the *Salmonella* Gallinarum ghosts induced significantly high systemic IgG response in all immunized groups. Among the groups, orally-vaccinated group B showed significantly higher levels of secreted IgA. A potent antigen-specific lymphocyte activation response along with significantly increased percentages of $CD4^+$ and $CD8^+$T lymphocytes found in all immunized groups clearly indicate the induction of cellular immune responses. Birds were subsequently challenged with a virulent *Salmonella* Gallinarum strain at 3 weeks post-immunization (wpi). Significant protection against the virulent challenge was observed in all immunized groups based on mortality and post-mortem lesions compared to the non-immunized control group. Overall, these findings suggest that the newly constructed *Salmonella* Gallinarum ghost appears to be a safe, highly immunogenic, and efficient non-living bacterial vaccine candidate that protects against FT.

Biography

Chetan V Jawale is basically a Veterinarian, currently pursuing PhD in Veterinary Medicine at college of Veterinary Medicine, Chonbuk National University, South Korea. He completed his B.V.Sc. and A. H. (2002-2007) from Bombay Veterinary College, Mumbai, India, and M.V.Sc in Animal biotechnology (2007-2009) from Anand Agricultural University, Anand, India. During 2009-2010 he worked as junior scientist at Xcelris Genomics Center, Ahmedabad, India. His research primarily focuses on the development of the recombinant and genetically inactivated vaccines against the *Salmonella* and E. coli infections in the domestic animals.

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