

## Immune Responses and Pathological Manifestations in Chicken to Oral Infection with *Salmonella typhimurium*

**Authors :** Mudasir Ahmad Syed, Raashid Ahmd Wani, Mashooq Ahmad Dar, Uneeb Urwat, Riaz Ahmad Shah, Nazir Ahmad Ganai

**Abstract :** *Salmonella enterica* serovar Typhimurium (*Salmonella Typhimurium*) is a primary avian pathogen responsible for severe intestinal pathology in younger chickens and economic losses. However, the *Salmonella Typhimurium* is also able to cause infection in humans, described by typhoid fever and acute gastro-intestinal disease. A study was conducted at days to investigate pathological, histopathological, haemato-biochemical, immunological and expression kinetics of NRAMP (natural resistance associated macrophage protein) gene family (NRAMP1 and NRAMP2) in broiler chickens following experimental infection of *Salmonella Typhimurium* at 0,1,3,5,7,9,11,13 and 15 days respectively. Infection was developed in birds through oral route at  $2 \times 10^8$  CFU/ml. Clinical symptoms appeared 4 days post infection (dpi) and after one-week birds showed progressive weakness, anorexia, diarrhea and lowering of head. On postmortem examination, liver showed congestion, hemorrhage and necrotic foci on surface, while as spleen, lungs and intestines revealed congestion and hemorrhages. Histopathological alterations were principally observed in liver in second week post infection. Changes in liver comprised of congestion, areas of necrosis, reticular endothelial hyperplasia in association with mononuclear cell and heterophilic infiltration. Hematological studies confirm a significant decrease ( $P < 0.05$ ) in RBC count, Hb concentration and PCV. White blood cell count showed significant increase throughout the experimental study. An increase in heterophils was found up to 7dpi and a decreased pattern was observed afterwards. Initial lymphopenia followed by lymphocytosis was found in infected chicks. Biochemical studies showed a significant increase in glucose, AST and ALT concentration and a significant decrease ( $P < 0.05$ ) in total protein and albumin level in the infected group. Immunological studies showed higher titers of IgG in infected group as compared to control group. The real time gene expression of NRAMP1 and NRAMP2 genes increased significantly ( $P < 0.05$ ) in infected group as compared to controls. The peak expression of NRAMP1 gene was seen in liver, spleen and caecum of infected birds at 3dpi, 5dpi and 7dpi respectively, while as peak expression of NRAMP2 gene in liver, spleen and caecum of infected chicken was seen at 9dpi, 5dpi and 9dpi respectively. This study has role in diagnostics and prognostics in the poultry industry for the detection of salmonella infections at early stages of poultry development.

**Keywords :** biochemistry, histopathology, NRAMP, poultry, real time expression, *Salmonella Typhimurium*

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