



## Non Typhoidal Salmonellosis from Companion Animals - An Emerging Threat

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### Abstract

Non-Typhoidal Salmonella are important foodborne bacteria that cause bacteremia, localized infection, and gastroenteritis. These resilient bacteria are particularly problematic in a wide range of immunocompromised patients, such as those undergoing corticosteroid therapy or other immunotherapy medications, diabetes, cancer patients, or those infected with the HIV virus. Deep bone or visceral abscesses, as well as endovascular infections, are significant consequences that can be challenging to treat. The introduction of novel or uncommon NTS serovars linked to human infection could be problematic for India's healthcare system. In this paper, a brief summary of the problems and advancements pertaining to non-typhoidal salmonellosis in companion animals is provided.

**Keywords:** Foodborne; High Risk Patients; Zoonosis; Enteric Infections

### Introduction

A neglected class of enteric infections, non-typhoidal Salmonella is disturbingly growing in India. Their numerous associated illnesses and treatment issues in developing countries have drawn attention from the scientific community globally. They are part of a group of pathogenic bacteria that belong to the family Enterobacteriaceae, causing numerous enteric diseases in humans. During the research period of 2016 to 2018, 999 suspected NTS isolates were collected from all over India, and they were assessed for the presence of NTS using phenotypic and serological methods. Along with a broad host range, NTS distribution varies greatly with time and place. The World Health Organisation states that both domestic and wild animals, such as chickens, dogs, cattle, pigs, cats, birds, and reptiles, are frequently exposed to NTS. The primary means of

dissemination are occupations that entail handling raw meat products and animals. Meat products are more likely to be contaminated with NTS when they are handled and transported raw, as well as when animals are slaughtered using unsanitary methods. There have also been reports of NTS survival and dissemination through the environment and aquatic bodies [2].

### Etiology

Non typhoidal Salmonella enterica (NTS) is a Gram-negative bacillus that is widely distributed and motile. It is a leading cause of gastrointestinal illness globally. Numerous animal hosts, including pigs, cattle, poultry, and wildlife, as well as companion animals like dogs, cats, birds, and reptiles, have their intestinal tracts colonised by Salmonella. Eating tainted food may trigger infections in hu-

mans. The disease spreads due to a number of factors, including inadequate sanitation and hygiene standards, inadequate food safety inspections, and others. Fish, dairy products, fruits, and sprouts constitute other sources. Since it is so common in nature and there are so many different vectors that facilitate its fecal-oral dissemination, salmonellosis is the most significant foodborne bacterial zoonosis. The rare transmission of Salmonella infections has been associated with undercooked eggs, as the illness may pass from chickens to eggs that seem normal to people [1].

### Clinical signs

Both humans and animals can have NTS infections, which often result in gastroenteritis and can vary in severity from moderate to severe. Typical symptoms include a high temperature, nausea, vomiting, diarrhea, and abdominal pain. This infection has the capacity to spread systemically outside of the digestive tract by entering the bloodstream or traveling through the lymphatic system. This may contribute to the pathogen developing remote abscesses in different organs, which would need to be diagnosed accurately and quickly to provide the finest therapy possible and prevent the infection from spreading. The age, health, and bacterial strain of the infection are among the variables that impact how different and severe the manifestations of NTS infections are triggered. The symptoms typically manifest 12 to 72 hours following exposure to the bacterium.

Non-typhoidal salmonellae are the primary cause of self-limiting enterocolitis in immunocompetent individuals. This condition is marked by vomiting, nausea, substantial amounts of watery diarrhea, and discomfort in the abdomen. These bacteria can survive in the gastrointestinal tract after diarrhea, and the use of antibiotics increases the probability of this happening. Primary NTS bacteremia is characterized by fever, vomiting, and pain in the abdomen without concomitant diarrhea [3].

As a result of the clinical similarities to febrile illnesses, extensive NTS infections may be challenging to diagnose and treat early. Serious consequences from NTS invasive infections can include osteomyelitis, infection of the lung, dehydration, sepsis, septic arthritis, and even death. In addition, intestinal perforation is a highly uncommon and potentially lethal consequence of a serious NTS infection. In order to avoid the condition from getting worse while mini-

mizing the chance of consequences, NTS invasive infections must be diagnosed and treated as soon as possible. Hospitalization may be necessary in severe cases to get supportive care and intravenous antibiotic medication. Individuals with underlying medical issues, such as compromised immunity, are especially susceptible to NTS infections and therefore must receive further care to prevent exposure.

### Diagnosis

Laboratory testing is usually required to diagnose NTS infections to verify the organism's detection. Stool cultures, wherein a sample of stool is examined to find out if salmonella bacteria are present, are the most often used diagnostic techniques. NTS illness can be challenging to distinguish from other pathogens without laboratory tests because their symptoms can be confused with those of other gastrointestinal infections. Moreover, because the bacteria may only sporadically be present in the stool, getting right samples for testing might be challenging. It has been claimed that chronic carriers can be identified by looking for Immunoglobulin G (IgG) to the Virulence (Vi) antigen. PCR, or polymerase chain reaction, is used to determine the organism.

### Treatment

Treatment decisions are influenced by both the infection site and the patient's immunological status. Recent reports have indicated that nontyphoidal Salmonella is beginning to show signs of resistance to both fluoroquinolones and third-generation cephalosporins. This resistance is expected to pose a therapeutic challenge in the future. Antibiotics, fluids, and rest are the usual lines of treatment. Typically, antibiotics are reserved for high-risk patients or situations in which the infection has spread outside of the gastrointestinal system. Antibiotic therapy should be guided by susceptibility testing to guarantee its efficacy. Taking an oral fluoroquinolone, such as ciprofloxacin, for a period of seven to ten days if the diagnosis is verified and the strain is susceptible, the suggested dose is suggested. If the organism exhibits resistance to or intermediate susceptibility to ciprofloxacin, oral azithromycin, similarly given at the recommended dose for seven days, is a successful substitute. While these may include pricey medications like carbapenems or tigecycline, a multidrug-resistant bacterium that is extended-spectrum beta-lactamase (ESBL) positive and resistant to azithromycin and ciprofloxacin has very few treatment options.

### Prevention and control

An integrated strategy is needed to address NTS infections in India. Making sure that food and water supplies are handled and treated effectively is a crucial beginning. This entails washing fruits and vegetables effectively, cooking eggs and meat to the right temperature, and avoiding non-pasteurized dairy products. Improving sanitary infrastructure, which includes pushing higher cleaning standards in public spaces and strengthening treatment of sewage and proper waste management systems, constitutes a way to control NTS. Yet another is ensuring food safety in wealthy nations from farm to fork. To promote excellent hygiene and food safety practices, it is also essential to run public awareness campaigns, and educational programs in schools and community centres, and use social media to get more information among individuals. To further guarantee adherence to hygienic standards, stringent laws and enforcement procedures must be put in place. This entails conducting routine inspections of dining facilities and penalizing those who are shown to violate the rules. Government organizations, medical professionals, and the general population must work together to address the problem of NTS transmission and lower its prevalence. We can make the environment safer and healthier for everyone if we band together [4].

### Conclusion

Due to its increased global incidences and persistence in an array of hosts, including people and animals, as well as its sources, which include food and the environment and often interacting to maintain a natural transmission cycle, non-typhoidal salmonellosis poses a serious threat to human health. Ultimately, reducing and managing NTS infections will require an extensive plan that includes enhanced infrastructure, public awareness campaigns, and government engagement.

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