DOI: 10.7860/JCDR/2019/41421.12997

Case Report

Microbiology Section

A Fatal Case of Acute Gastroenteritis with Sepsis due to *Salmonella enterica* Serovar Kentucky in an Immunocompetent Patient: A Case Report

SUMANA MAHADEVAIAH NEELAMBIKE[1], SOWMYA GOVINDANAHALLI SHIVAPPA[2]

ABSTRACT

Non Typhoidal *Salmonella* are the common agents causing bacterial food borne gastroenteritis. They are the leading cause of bacterial food borne disease outbreaks and human gastroenteritis in developed countries and also a worry to public health in developing countries.

A fatal case of acute gastroenteritis with septic shock due to *S. Kentucky* bacteraemia in an immunocompetent patient is reported in this article. The *S. Kentucky* isolate in this case was susceptible to all classes of antibiotics in contrast to the multidrug resistance pattern observed globally.

Awareness of various Non Typhoidal *Salmonella* causing human infections is of utmost importance, because delayed identification, serotyping and susceptibility testing may delay the administration of antibiotics leading to worsening outcomes. Hence identification of *Salmonella* to species and subspecies level is necessary.

Keywords: Bacteraemia, Fatal gastroenteritis, Non typhoidal *Salmonella*

CASE REPORT

A 52-year-old woman presented with two days history of high grade fever with chills, watery stools- 8-10 episodes per day and 2-3 episodes of vomiting per day and history of altered sensorium once. She was not diabetic or hypertensive and was not on any medications for prolonged duration.

On examination, the patient was febrile (102ºF), pale, dehydrated with pulse rate of 140/min, blood pressure 90/56 mm Hg, respiratory rate 42/min and SPO_2 90%. Respiratory system, central nervous system and per-abdominal examination were normal. Cardio vascular system examination revealed tachycardia. Fundoscopy examination revealed signs of early papilloedema.

Haematological parameters showed an increase in total leucocyte count to 12,300 cells/cumm with 80% predominance of neutrophils, platelet count of 1 lac/cumm and raised ESR of 40 mm. Renal function tests were elevated with blood urea 37 mg/dL and serum creatinine level 2.3 mg/dL. The serum lactate level was 4.1 mmol/L on admission which was increased to 7.1 mmol/L. Serum electrolytes and liver function tests were normal. Arterial blood gas analysis revealed severe metabolic acidosis. Her HIV status was negative.

Urine microscopy and culture was normal. Faeces microscopic examination showed plenty of leucocytes, few RBC's and no parasitic forms. Faeces culture yielded the growth of Non lactose fermenting colony on Mac conkey agar, green coloured colony with black centre on Hecktoin Enteric agar. The organism was Gram negative bacilli, motile, gave negative oxidase and positive catalase tests. It reduced nitrates to nitrites, fermented glucose to both acid and gas production and did not ferment lactose. Indole test, urease test and voges proskauer tests were negative, methyl red test was positive. It utilised citrate and produced alkaline slant with acidic butt with abundant hydrogen sulfide in triple sugar iron agar [1].

The isolate gave positive agglutination with Poly O antisera and Hi antiserum and negative with O2, O4 and O9 antisera. Based on the biochemical reactions and agglutination, the organism was provisionally identified as *Salmonella typhimurium* [1]. The isolate was tested for antibiotic susceptibility by Vitek Compact 2. The Minimum Inhibitory Concentration (MIC) of various antibiotics for the isolate is given in [Table/Fig-1].

Antimicrobial	MIC	Interpretation	Antimicrobial	MIC	Interpretation
Ampicillin	<2	S	Imipenem	<0.25	S
Amoxicillin/ Clavulanic acid	<2	S	Meropenem	<0.25	S
Piperacillin/ Tazobactum	<4	S	Amikacin	<2	R
Cefuroxime	4	R	Gentamicin	<1	R
Ceftriaxone	<1	S	Nalidixic acid	<2	S
Cefoperazone/ Sulbactum	<8	S	Ciprofloxacin	<0.25	S
Cefepime	<1	S	Tigecycline	<0.5	S
Ertapenem	<0.5	S	Cotrimoxazole	<20	S
Colistin	<0.5	S			

[Table/Fig-1]: Antimicrobial minimum inhibitory concentration results for *S.* Kentucky recovered from faeces and blood culture.

Two sets of blood culture samples were collected before the administration of antibiotics and were loaded to BacT/Alert system (bioMerieux, Inc) and both the samples flagged positive within 24 hours of incubation. Direct Gram stain of the direct smear from blood culture showed Gram negative bacilli and subculture was done on Mac conkey and blood agar plates and was incubated aerobically at 37ºc for 24 hours.

Non lactose fermenting colonies were seen on Mac Conkey agar and greyish translucent colony on blood agar. The biochemical reactions, antibiotic susceptibility pattern and agglutination pattern were similar to the strain isolated from faeces culture. Both the isolates were sent to National *Salmonella* and *Escherichia* centre, Central Research Institute, Kasauli (H P) where it was identified as *Salmonella Kentucky* with antigenic formula 8:i:Z6.

The case was clinically diagnosed as Acute Gastroenteritis with sepsis in shock with severe metabolic acidosis and patient was given fluid challenge, inotropes (noradrenaline and dopamine) and intravenous piperacillin-tazobactum and metronidazole. Patient was intubated on 2nd day in view of low oxygen saturation. Inspite of fluid challenge and inotropes, patient had persistent hypotension and inotropes were increased accordingly. Patient had cardiac arrest and could not be revived and was declared dead 48 hours after admission.

DISCUSSION

Non Typhoidal *Salmonella* (NTS) infections are one of the leading causes of bacterial food borne gastroenteritis. NTS causes self-limiting diarrhoeal illness in healthy individuals, while it causes invasive life threatening Salmonellosis among infants, children, elderly and immunocompromised patients [2].

NTS infections in humans are usually associated with ingestion of contaminated food of animal origin as well as contact with infected animals [3]. Recently, *Salmonella enterica* subspecies *enterica* serovar Kentucky has emerged as the predominant *Salmonella* serovar isolated from poultry, chicken and meat, but is less commonly isolated from cases of human Salmonellosis [4].

This paper reports a fatal case of *Salmonella enterica* serovar Kentucky causing acute gastroenteritis with septic shock and severe metabolic acidosis in an overtly immunocompetent patient. Most of the deaths have been reported only among immunocompromised patients. This strain showed biochemical reactions similar to that of *Salmonella paratyphi*-B or *Salmonella typhimurium* and gave positive agglutination with Poly O and Hi antiserum and negative with O4 antisera. An identification of *Salmonella enterica* serovar Kentucky can be thought of in any isolate with these biochemical reactions and agglutination pattern.

Salmonella Kentucky causing non-fatal human infections have been reported in various parts of the world, but there are not sufficient reports available from India. Kumar D et al., has reported the isolation of 24 strains of *Salmonella* Kentucky from stool samples [5] and four isolates have been isolated by study conducted by Basu S et al., in 1975 [6].

Resistance to quinolones and carbapenems among *Salmonella* Kentucky is a growing concern as it limits the treatment options for invasive salmonellosis. But the isolate in this case was susceptible to all drugs. This is evidence that it could be an emergence of new highly virulent susceptible strain, which has to be confirmed by genotyping. Preventive measures should be taken to prevent the spread of such highly virulent strains in the community.

Overall, this case is noteworthy due the severe invasiveness of the infection caused by a susceptible strain of *Salmonella* Kentucky leading to severe gastroenteritis associated with septic shock resulting in death of an immunocompetent patient.

CONCLUSION

Awareness of various NTS causing human infections and their identification to species and subspecies level is necessary. An identification of *Salmonella enterica* serovar Kentucky can be thought of in any isolate which gives positive agglutination with Poly O and Hi antiserum and negative with O4 antisera. Also careful attention is needed to antibiotic susceptibility testing to ensure that new threats such as drug resistance to quinolones, carbapenems, cephalosporins and biofilm formation are recognised early and addressed before they are widely disseminated. A coordinated approach by National and International health, food and agriculture authorities is necessary for strict pathogen control strategies to limit further spread of this strain.

REFERENCES

[1] Old DC. Salmonella. In: Collee JG, Fraser AG, Marmion BP, Simmons A, Mackie & McCartney Practical Medical Microbiology. 14th ed. Churchill Livingstone; 2012.
[2] Evans JA, Adusei A, Timmann C, May J, Mack D, Agbenyega T, et al. High mortality of infant bacteraemia clinically indistinguishable from severe malaria. QJM. 2004;97(9):591-97.
[3] Magwedere K, Rauff D, De Klerk G, Keddy KH, Dziva F. Incidence of nontyphoidal *Salmonella* in food producing animals, animal feed and the associated environment in South Africa. Clin Infect Dis. 2015;61(4):S283-89.
[4] Parveen S, Taabodi M, Schwarz JG, Oscar TP, Harter-Dennis J, White DG. Prevalence and antimicrobial resistance of *Salmonella* recovered from processed poultry. J Food Prot. 2007;70(11):2466-72.
[5] Kumar D, Sharma NC, Seth DK, Gupta SK. Emergence of ciprofloxacin resistant *Salmonella enterica* serotype Kentucky in Delhi, India during 2012-2014. J Vaccines Vaccin. 2015;6(4):78-80.
[6] Basu S, Dewan ML, Suri JC. Prevalence of *Salmonella* serotypes in India: A 16-year study. Bull World Health Organ. 1975;52:331-36.

PARTICULARS OF CONTRIBUTORS:
1. Professor and Head, Department of Microbiology, JSS Academy of Higher Education and Research, Mysore, Karnataka, India.
2. Associate Professor, Department of Microbiology, JSS Academy of Higher Education and Research, Mysore, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Sowmya Govindanahalli Shivappa,
764, 8th Main, B Block, Vijaynagar 3rd Stage, Mysore-570030, Karnataka, India.
E-mail: sowmyashivappa@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Mar 04, 2019**
Date of Peer Review: **Apr 13, 2019**
Date of Acceptance: **May 25, 2019**
Date of Publishing: **Jul 01, 2019**