Incidences of Salmonellosis in Urban and Sub-Urban Areas of Akola City

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ABSTRACT

Outbreaks of enteric fever have been reported from different parts of India. Increasing population of India and unhygienic methods of handling food-stuffs, improper eating life style and unsatisfactory purification of water supply led to increased chances of microbial infections. Salmonellosis is caused by *Salmonella* species which covers wide spectrum of diseases. *Salmonella* are strict parasites of animals and humans. Infections of Salmonellae include enteric fever, septicaemia, gastroenteritis and food poisoning. Typhoid fever, which was once prevalent all over the world, has been virtually eliminated from the advanced countries, but still is a problem in developing countries leading to epidemics. Considering the unsatisfactory and unsustainable hygienic conditions, especially in rural areas of Akola, the present work has been carried out. *Salmonella* spp. were isolated from drinking water, milk and food samples from urban and sub-urban areas of Akola during rainy season and their prevalence was studied.

INTRODUCTION

The diseases caused by *Salmonella* is commonly termed as Salmonellosis (Bocomer 1965). *Salmonella* are among the most common bacterial foodborne pathogens worldwide. The bacterium of family Enterobacteriaceae causes enteric fever, gastroenteritis, food poisoning, etc. *Salmonella* food poisoning is a widespread zoonotic disease. Man gets infection from farm animals through contaminated meat, milk and milk products, sausages, custards, eggs and egg products. The species most often incriminated in human outbreaks are *Salmonella typhimurium, S. enteritidis, S. cholerasuis* (Park et al. 1995).

Foodborne diseases are among the most serious health problems affecting public health and development worldwide (WHO 1984). Industrialization, mass food production, decreasing trade barriers and human migration have disseminated and increased the incidences and severity of foodborne diseases (Gomez et al. 1997).

S. enteritidis is the most common *Salmonella* serotype in humans globally, especially in Europe, where it accounts for 85% of *Salmonella* cases, Asia (38%), and Latin America and Caribbean (31%). The *S. enteritidis* pandemic was first noted in the late 1980s and has been attributed to contaminated eggs (Rodrigue et al. 1990). They cause an estimated 1.4 million cases of foodborne diseases each year in the United State alone (Voetsch et al. 2004). Nowadays typhoid fever remains a public health problem in developing countries (Saha et al. 2003).

Salmonella typhi is a pathogen of concern in the developing world, especially Asia. *Salmonella enterica* serovar paratyphi A is the second most common cause of enteric fever after *S. typhi.*

Approximately 0.25 millions *S. paratyphi* A infections (paratyphoid fever) occur for each *S. typhi* infection (typhoid fever) (Crump et al. 2004). In India *S. typhi* is the commonest species responsible for enteric fever (Pillai et al. 1993). Salmonellosis was also reported in municipal water supply and in river Morna at District Akola of Maharashtra (Musaddiq 1992, 2001).

The present study was conducted in urban and suburban areas of Akola city to assess water and food contamination by bacterial pathogens. The main objective of this study was to isolate and identify the enteric pathogen *Salmonella* from drinking water and food samples.

MATERIALS AND METHODS

Water and food samples were collected from different areas of Akola city in sterilized bottles, which were then transferred aseptically in tetrathionate broth (Hi-Media, Mumbai) and kept for incubation at 37°C for 1-2 hrs.

A loopful of sample was taken aseptically and streaked on Hi-Media's agar. Salmonella Shigella agar (SS), xylose lysine deoxycholate agar (XLD), bismuth sulphite agar (BSA), brilliant green agar (BGA), Hekton enteric agar (HE), deoxycholate agar (DCA) and MacConkey's agar plates and colony characteristic were studied. Morphological characteristics viz., size, shape, etc. of isolates were studied by staining the culture smears by Gram's staining method. The biochemical tests viz., triple sugar iron agar, sugar utilization, IMViC, and enzymes (urease, catalase, oxidase, gelatinase), motility and nitrate reduction tests were conducted for typical *Salmonella. Salmonella* was identified and confirmed after incubation period of 37°C for 24 hours by colony characteristics on different media, Gram reaction, biochemical characterization and standard microbiological techniques described by Collins & Lyne (1970).

RESULTS AND DISCUSSION

The results of the study are given in Tables 1 and 2. Of the total samples analysed only 10% samples showed the presence of *Salmonella.* It was evident that Salmonellae, present in given samples, were Gram negative rods, motile, positive to biochemical tests viz., TSI, sugar utilization tests viz., glucose, mannitol, dextrose, maltose, IMViC, enzyme tests and nitrate reduction.

The contamination of enteric pathogen *Salmonella* was there in the public drinking water and food stuffs, which was hazardous to public health. There is need of proper water purification and sanitization to avoid epidemics of enteric diseases like typhoid, food poisoning, etc. caused by *Salmonella* species.

In conclusion of the present study, the organisms isolated from non-clinical samples were

Table 1: Colony characteristics of *Salmonella* on different media.

Sr. No.	Type of media (Hi-Media, Mumbai)	Colony characters
1.	SS agar	Colourless with black centered colonies, 2.0 mm
2.	XLD agar	Red with black centered colonies, 2.5mm
3.	BGA agar	Colourless with red centered colonies, 2.0 mm
4.	MacConkey's agar	Pale colour colonies, 2.0 mm
5.	BSA	Jet black colonies with metallic sheen, 3.0 mm
6.	DCA	Colourless colonies, 3.0mm
7	HE agar	Blue green colonies with black centre, 2.5mm

Table 2: Morphological and biochemical characters of *Salmonella typhi*.

Sr.No.	Morphological characters	Remarks
1.	Gram reaction	Gram negative rods.
2.	Motility	Motile
3.	Triple sugar iron agar (Slope Butts, H_2S Production)	Alkaline, Acidic, +ve
	Sugar utilization test	
4.	Glucose A/G	+ve/+ve.
5.	Mannitol A/G	+ve/+ve
6.	Dextrose A/G	-ve/-ve
7	Sucrose A/G	-ve/-ve
8	Maltose A/G	+ve/+ve
9	Lactose A/G	-ve/-ve
	Biochemical characters	
10	Indole	-ve
11	Methyl red	+ve
12	Voges Proskaur	-ve
13	Citrate	+ve
	Enzymes	
14	Catalase	+ve
15	Oxidase	-ve
16	Urease	+ve
17	Gelatinase	-ve
18	Nitrate reduction	+ve

identified as Gram negative enteric pathogen *Salmonella*. Owning to epidemiological status and seasonal variations, particularly in rainy season, the noticeable rise in *Salmonella* species in public drinking water and different food stuffs continues to pose a challenge to Akola Municipal Corporation. Contamination of the drinking water and various food stuffs by the bacterium is the source of infection.

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