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Case Study

Seroprevalence of *Salmonella* Paratyphi in Haryana – four year study at a tertiary health care center

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ABSTRACT

Enteric fever is a common cause of febrile illness in developing countries including India. The principal causative agent is *Salmonella* Typhi. In the Indian subcontinent, *Salmonella* Paratyphi A is also prevalent and the incidence of paratyphoid fever is reported to be increasing. The diagnosis of typhoid and paratyphoid fever is best made by isolating the bacteria from blood or stool specimens. The rising titer of antibodies against *Salmonella* antigens also helps in the diagnosis, especially where culture facilities are deficient. The present study was carried out to determine the seroprevalence of *S.* Paratyphi A in a tertiary care hospital in northern India. A rising trend of antibody titers was observed over a period of four years.

Keywords: Enteric fever, Paratyphi A, Widal, seroprevalence

INTRODUCTION

Enteric fever is a noted cause of morbidity worldwide with an estimated 21.7 million cases, the majority being reported from India, South America and sub-Saharan Africa. [1] It is classically caused by *Salmonella enterica* serotype Typhi. *Salmonella enterica* serotype Paratyphi A is also prevalent in the Indian subcontinent, while *S.* Paratyphi B is found in Indonesia, Malaysia and the Mediterranean region, and *S.* Paratyphi C in Africa.[2] *S.* Paratyphi A causes a milder form of the disease and was reported less frequently in India. However an increasing trend has been observed since 1996. [3] Human beings are the only reservoir and the disease is transmitted by faecally contaminated water and food in endemic areas, especially by carriers. [4] Definitive diagnosis of enteric fever is made by isolation of *Salmonella* spp. from blood, bone marrow, faeces or urine specimens. However, in many countries including India, Widal test is widely used for diagnosis of enteric fever because it is relatively cheap, easy to perform and requires minimal training and equipment. Specific antibody levels in excess of the baseline or four-fold rise in antibody titers over 10-14 days are considered diagnostic of enteric fever. [5] The present study was carried out to determine the seroprevalence of *S.* Paratyphi A and the trend over four years, in a tertiary care hospital in northern India.

MATERIAL AND METHODS

The retrospective study was conducted on serum samples received in the Department of Microbiology, from suspected cases of enteric fever over a period of four years (January 2010 to December 2013). The serum samples were tested by Widal tube agglutination test using commercially available lipopolysaccharide 'O' and protein flagellar 'H' antigens of *S.* Typhi and *S.* Paratyphi A (Central Research Institute, Kasauli, India). Double dilutions of patients sera (1:40 to 1:320) were tested and positive and negative controls were included in each batch. The tubes were incubated at 37°C for 2 hours, at room temperature overnight and then examined for agglutination. In a study conducted by the same authors, it was concluded that the titer of H agglutinins of *S.* Paratyphi A was 1:40 in this region.[5, 6] Hence, titer of 1:80 was taken as the cut-off in the present study.

RESULTS

Prevalence rates observed were: 1.6% in 2010, 2.1% in 2011, 2.4% in 2012 and 3.1% in 2013.The male to female ratio also varied from 1.47 in 2010 to 0.82 in 2013. In the year 2010, maximum seropositive patients were in the age-group of 41-50 years; while in the subsequent years most cases were 21-30 years old (table 1). Higher titers (>

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1:160) were noted more frequently than lower titers of 1:40 to 1:80 (table 2).

DISCUSSION

Accurate diagnosis of typhoid fever at an early stage is important not only for diagnosis of etiological agent, but also to identify individuals who serve as carriers and may be responsible for outbreaks of enteric fever.[7] In the present study, an increasing trend of seropositivity was observed, with prevalence rising from 1.6% in 2010 to 3.1% in 2013. A change in the age and gender distribution was also noted. The older adults (41-50 years) were most affected in 2010. Subsequently in 2011, 2012 and 2013, most cases were reported in young adults (21-30 years). In 2010-2012, males were more frequently affected, while in 2013 females outnumbered the male cases. In the study by Andualem et al, 1.5% cases of *S.* Paratyphi were identified.[8]Several studies have reported similar increase in enteric fever due to *S.* Paratyphi A.[9-11] Poor sanitation and hygiene in the rural areas, and rapid urbanization with lack of infrastructure contribute to the spread of disease in the community. Also, vaccination against *S.* Typhi may have led to a relative increase in prevalence of paratyphoid fever. Spreading awareness and provision of sanitation in rural areas and urban slums are essential to control such diseases.

CONCLUSION

Over the four year period, an increase in seroprevalence of *S.* Paratyphi A was noted among all age-groups, irrespective of gender. The poor hygiene, lack of healthcare facilities and the rising population, especially in rural areas, have led to high seroprevalence of *S.* Typhi and *S.* Paratyphi A in the region.

Table 1: Age and gender distribution of *Salmonella* Paratyphi A

Age groups(years)	**2010**		**2011**		**2012**		**2013**	
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**
0-10	1	-	11	7	8	10	13	13
11-20	4	1	11	10	12	9	14	20
21-30	6	-	18	10	18	15	20	20
31-40	16	16	10	12	10	7	9	14
41-50	20	17	10	6	7	9	6	11
51-60	1	-	2	-	6	8	9	15
61-70	1	-	-	-	4	3	7	4
71-80	1	-	-	-	3	-	2	-
Total	50	34	62	45	68	61	80	97
Total no. of samples	5197		4990		5328		5647	

Table 2: Prevalence of *S.* Paratyphi A titer

Titer	**2010**	**2011**	**2012**	**2013**
1:40	25	27	36	44
1:80	11	-	-	-
1:160	22	10	49	47
1:320	51	97	80	130

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