

# Seroprevalence of Enteric Fever: Hospital Based Study

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## ABSTRACT

**Introduction:** Enteric fever which includes typhoid and paratyphoid fever is a systemic febrile illness caused by the bacteria *Salmonella enterica* serovar typhi and *Salmonella enterica* serovar paratyphi A, B and C respectively. Although the gold standard for definitive diagnosis of Enteric fever is isolation of *Salmonella* species in culture, the Widal test has been widely used for the diagnosis of Enteric fever, simply owing to the fact that no other sero-diagnostic test of sufficient sensitivity and specificity along with cost effectiveness has been developed till date, especially in typhoid endemic regions.

**Objective:** The objective of this study was to determine the seroprevalence of Enteric fever in Nepalgunj Medical College, Kohalpur, Banke.

**Materials and Method:** This is a descriptive hospital based study. The study was conducted at Nepalgunj Medical College, Kohalpur, Banke. In this study, a total of 378 cases of suspected Enteric fever were studied in period from 12-01-2017 to 06-07-2017.

**Result:** A total of 378 samples, 24 (6.34%) were positive. Out of the 378 samples, 267 (70.63%) samples were from males and 111 (29.37%) samples were from females. Most of the samples 94 (24.86%) were from 20-29 years age group and the higher positive cases which were 8 (2.12%) cases also found in this same age group. More positive cases were observed in males 14 (3.70%) than females 10 (2.64%).

**Conclusion:** Enteric fever remains an important public health problem in developing countries. The proper sanitation, public health education and vaccination are the long term preventive measures to decrease or control the disease. Updated data on the incidence or prevalence of typhoid fever is essential before introducing the vaccines into regular programmed.

**Keywords:** Enteric fever; *Salmonella* paratyphi; *Salmonella* typhi; seroprevalence; Widal test.

## INTRODUCTION

Enteric fever which includes typhoid and paratyphoid fever is a systemic febrile illness caused by *Salmonella enterica* serovar typhi and *Salmonella enterica* serovar paratyphi A, B or C. *Salmonella enterica* serovar typhi along with paratyphi A is found to be associated with more

than 90% of cases enteric fever. The paratyphoid fever is clinically similar but milder than typhoid fever.<sup>1</sup>

Enteric fever is still an existing health problem in many developing countries. According to the most recent estimates (2014), approximately 21 million cases and 2,22,000 typhoid-related deaths occur

annually worldwide.<sup>2</sup> Outbreaks are also frequently reported from Sub-Saharan Africa and Southeast Asia.<sup>3</sup> Nepal is considered as endemic region to enteric fever.<sup>4</sup>

The definitive diagnosis of typhoid fever requires the isolation of *Salmonella typhi* from blood, faeces, urine or other body fluids. In developing countries, facilities for isolation and culture are often not available especially in smaller hospitals and diagnosis relies upon the clinical features of the disease and detection of agglutinating antibodies to *Salmonella typhi* by Widal test.<sup>5</sup> Over 100 years since its introduction, Widal test is still being widely used for the diagnosis, simply owing to the fact that no other sero-diagnostic test of sufficient sensitivity and specificity along with cost-effectiveness has been developed, especially in typhoid endemic regions.<sup>6</sup>

## MATERIALS AND METHOD

This was a descriptive cross-sectional hospital based study, conducted in the serology section of Microbiology Department, Nepalgunj Medical College, Kohalpur, Nepal. A total of 378 cases of suspected Enteric fever were studied from 12-01-2017 to 06-07-2017.

Widal test: The slide test type of Widal test was done to detect antibodies against O and H antigens of *Salmonella typhi* (*S. typhi*) and H antigens of *Salmonella paratyphi A* and *Salmonella paratyphi B*. *Salmonella* antigen set was used for Widal test (Agappe Diagnostics Limited). All the sera samples were initially analysed for *S. typhi* antibodies on a clean greaseless tile. Drop of Widal suspension antigens were placed unto undiluted sera samples in different volumes, mixed by gently rotating the tiles for 1 to 2 minutes and observed for agglutination. The sample that showed granules (agglutination) with any of the antigen suspension on the tile was considered positive and those that did not agglutinate were considered negative. The titer of  $\geq 100$  for the O antibodies and that of  $\geq 200$  in case of H antibodies were considered to be significant.<sup>7</sup>

## RESULT

In the present study out of 378 samples 24 (6.34%) were positive. Out of the total samples, 267 (70.63%) samples were from males and 111 (29.37%) were from females (Table 1). Most of the samples 94 (24.86%) were from 20-29 years age group and only 16 (4.23%) samples from more than 60 years of age group. A total of positive cases were 14 (3.70%) from males and 10 (2.64%) from females (Table 2).

**Table 1: Total number of subjects with respect to gender and age group n (%).**

Age group (years)	Male	Female	Total
≤9	52 (13.70)	22 (5.82)	74 (19.51)
10 – 19	54 (14.25)	15 (3.96)	69 (18.21)
20 – 29	68 (17.95)	26 (6.87)	94 (24.82)
30 – 39	45 (11.83)	19 (5.08)	64 (16.91)
40 – 49	29 (7.55)	8 (2.17)	37 (9.72)
50 – 59	8 (2.40)	16 (4.21)	25 (6.61)
≥60	11 (2.95)	5 (1.26)	16 (4.21)
<b>Total</b>	<b>267 (70.63)</b>	<b>111 (29.37)</b>	<b>378 (100)</b>

**Table 2: Distribution of enteric fever cases with respect to gender and age group n (%).**

Age group (years)	Male	Female	Total
≤9	4 (1.06)	3 (0.79)	7 (1.85)
10 – 19	-	1(0.26)	1(0.26)
20 – 29	6 (1.58)	2(0.54)	8(2.12)
30 – 39	2(0.54)	3(0.79)	5(1.33)
40 – 49	-	1(0.26)	1(0.26)
50 – 59	1(0.26)	-	1(0.26)
≥60	1(0.26)	-	1(0.26)
<b>Total</b>	<b>14(3.70)</b>	<b>10(2.64)</b>	<b>24(6.34)</b>

## DISCUSSION

The Enteric fevers are diagnosed clinically without proper laboratory evidence and consequently treated presumptively with antibiotics. The real concern is that though the gold standard technique of culture isolation of *Salmonella typhi* provides a definitive diagnosis in 73-97% of cases prior to medications, excessive antibiotic use have reduced this isolation rate to 40-60%. Isolation of *Salmonella typhi* or paratyphi is time taking and the facilities for blood cultures are not always feasible in resource poor regions. All these limitations have made Widal test (a rapid slide agglutination test) the most utilized test for enteric fever.<sup>8</sup>

The study conducted in serology section of Microbiology Department, Nepalgunj Medical College, Kohalpur, Nepal. The seroprevalence of Widal positivity showed 6.34% in our present study. Enteric fever is endemic to all parts of Nepal and still constitutes a significant health hazards. In another study done in Dhulikhel, the prevalence is 59% which is much higher than present study.<sup>9</sup>

Pandey et al conducted a study in Kathmandu Model Hospital where the seroprevalence showed that of 27% which also higher than present study.<sup>10</sup> A study conducted by Sekharan showed the prevalence was 27.05%, this prevalence rate is also higher than present study.<sup>11</sup>

Sharma et al conducted a study, in which the seroprevalence was 10.8%, the maximum positive patients were also in 15-30 years which is close to the present study about prevalence and age group, this may indicate that most *Salmonella* infection occurs mainly in young adults. 8 Similar study was conducted by Lall et al, in which seroprevalence was 6.2%, the prevalence is similar to present study.<sup>12</sup>

## CONCLUSION

Enteric fever caused by *Salmonella typhi* and paratyphi, is an important cause of community-acquired septicemia, morbidity and mortality in Nepal as in many other countries. The Widal test is an easy, cheap and relatively non invasive test.

The present study reinstates the importance of Widal test in diagnosing enteric fever infections in a developing country like Nepal. A drawback of this study was that the correlation with the blood culture was not done, as only the serum samples were analysed. However, this hospital based study provided an inexpensive way to estimate the burden of infection of enteric fever among the patients in our country.

Thus the test can be of diagnostic value in the early stage of the disease and help in reducing morbidity and mortality.

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