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Paratyphoid Fever in India: An Emerging Problem

To the Editor: Enteric fever is a major public health problem in India, accounting for more than 300,000 cases per year, *Salmonella typhi* is the most common etiologic agent (1), but *Salmonella paratyphi A*, the other causative agent, causes more asymptomatic infections than *S. typhi*. According to earlier reports from India, *S. paratyphi A* was implicated as a causative agent in 3%-17% of enteric fever cases (2). However, a large community-based study in an urban slum of Delhi during October 1995 to October 1996 found that *S. paratyphi A* caused approximately 20%-25% of the cases of enteric fever in this region (3). An outbreak of enteric fever due to a single *S. paratyphi A* strain in an urban residential area was reported in 1996 from New Delhi, where contaminated water was

implicated as the probable source (4,5). This outbreak prompted a retrospective analysis of the laboratory records of the All India Institute of Medical Sciences, New Delhi, over a 5-year period (1994-1998) to study the change, if any, in the etiology of enteric fever in North India.

We evaluated all blood culture records from the institute's clinical bacteriology laboratory for April to October (the months with the highest number of enteric fever cases) each year. Records were from patients residing in New Delhi and the surrounding areas of North India. The blood was collected by a phlebotomist in the outpatient department or by a resident doctor in hospital wards. Blood cultures were carried out by standard laboratory technique (6). Five ml of blood was added to 50 ml of brain heart infusion broth (Hi-Media Laboratory, India) under aseptic conditions. Bacterial identification was accomplished by standard microbiologic protocol (6). Susceptibility to antibiotics (amoxycillin, chloramphenicol, cotrimoxazole, gentamicin, ciprofloxacin, and ceftriaxone) was tested by the comparative disk diffusion method (Stokes method) (7). Chi-square for trend was calculated, and the p value was determined.

The total number of blood cultures performed for enteric fever cases (10,109 in 1994, 12,092 in 1995, 17,652 in 1996, 15,997 in 1997, and 17,012 in 1998) did not change significantly over this period. The isolation of *S. typhi* changed little (Chi-square = 2.367; p = 0.123; statistically not significant). However, the proportion of *S. paratyphi A* isolates rose from 6.5% in 1994 to 44.9% in 1998 (Chi-square = 22.20; p <0.001; statistically significant). The proportion of *S. paratyphi A* isolations in enteric fever cases from 1994 to 1998 was 6.5%, 21.2%, 50.5%, 30.7%, and 44.9%, respectively. Even excluding the strains from the 1996 outbreak (4), we found that the proportion of *S. paratyphi A* in enteric fever cases increased compared with *S. typhi* (Chi-square = 30.528; p <0.001). With our catchment area, case definition of enteric fever, and laboratory methods remaining the same during this period, it appears that the etiology of enteric fever in North India is changing significantly.

The age-wise distribution of *S. typhi* and *S. paratyphi A* showed that *S. typhi* was a significant isolate from children < 5 years of age, while this distribution was not observed for *S. paratyphi A*, which involved those > 5 years

of age. Sex was not significantly associated (mean male to female sex ratio was 32.4:18 for *S. typhi* and 15.8:10.6 for *S. paratyphi A*).

S. typhi has become increasingly sensitive to amoxicillin, chloramphenicol, and gentamicin, increasing from 75.1% in 1994 to 96.6% in 1998 for amoxicillin, from 71.9% in 1994 to 91.6% in 1998 for chloramphenicol, and from 96.4% to 100% for gentamicin. *S. paratyphi A* strains have remained uniformly sensitive (100%) to all antibiotics (amoxicillin, chloramphenicol, and gentamicin, as well as ciprofloxacin and ceftriaxone) used in the treatment of enteric fever. In light of reports of multidrug resistance in *S. typhi*, especially to quinolones, continued surveillance and monitoring of antimicrobial sensitivity of *S. paratyphi A* strains are needed.

The increase in proportion of *S. paratyphi A* cases, which may be due to a high degree of clinical suspicion (with mild fever cases investigated for enteric fever), changing host susceptibility, or even change in the virulence of the organism, should be further investigated.

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Hepatitis C Virus RNA Viremia in Central Africa

To the Editor: Epidemiologic serosurveys have demonstrated high prevalence (6%-15%) of hepatitis C virus (HCV) infection in adults in sub-Saharan Africa (1-4). Although possible false-positive HCV serologic test results have been reported in Africa, HCV prevalence rates suggest a high rate of chronic infection among persons with anti-HCV antibodies (5,6). We have focused on HCV RNA infectivity of blood from donors attending the National Blood Center in Bangui, Central African Republic.

We prospectively tested all blood donors between February and April 1998 for serum anti-HCV antibodies by both an HCV third-generation enzyme-linked immunosorbent assay (ELISA) (Abbott HCV EIA 3.0 test, Abbott, Chicago, IL, USA), which was chosen as a reference test for immunoglobulin (Ig) G antibodies to HCV, and by a simple membrane immunoassay system (Ortho HCV Ab Quik Pack, Ortho Diagnostic Systems Inc., Tokyo, Japan) (7). Anti-HCV-positive serum samples were further subjected to qualitative detection of HCV RNA by reverse transcription-polymerase chain reaction (AMPLICOR-HCV, Roche Diagnostic Systems, Inc., Branchburg, NJ, USA) (8). Of 163 serum samples (mean age \pm standard deviation, 30 \pm 8 years), 155 were from male blood donors, 83 (51%) from first-time donors, and 125 (77%) from donors in the recipient's family. Fifteen (9.2%; 95% confidence interval [CI] 5%-15%) samples contained IgG to HCV by ELISA. Of the ELISA-positive samples, 14 were positive by the Quik Pack assay (sensitivity, 93.0%); of the 148 remaining ELISA-negative samples, 147 were negative by the Quik Pack assay (specificity, 99.3%). The agreement between the results of the two methods was 98.7%. Of the 163 samples, 10 (6.1%; CI 95%: 3%-11%) were positive for HCV antibodies (by ELISA and rapid test) and for HCV RNA.

We confirmed a high prevalence of HCV-seropositivity among blood donors in Bangui and the subsequent high rate of HCV RNA viremia blood donations. To offset the major risk for transfusion-acquired HCV in Central Africa we recommend screening donated blood for anti-HCV. When laboratory facilities to perform ELISA are not available, the Quik Pack system,