

Typhoid Fever Trends in Nepal: Analysis from Om Hospital Research Center and Antimicrobial Resistance Surveillance in Nepal

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Background: Typhoid fever remains as a major public-health challenge in Nepal. Monitoring of typhoidal *Salmonellae* was included in National Antimicrobial Resistance (AMR) Surveillance following an outbreak due to multi-drug-resistant strains in Bharatpur, in 2002.

Methods: *Salmonella enterica* Typhi and Paratyphi reported through AMR Surveillance and Om Hospital and Research Center (OHRC), Kathmandu were analyzed to investigate temporal and geographical distribution, patients' gender and age, the changes in serotypes and antimicrobial resistance.

Results: A total of 3453 *Salmonella enterica* isolates from Nationwide AMR surveillance at four different time intervals and 584 isolates reported from OHRC during 2009 to 2014 were analyzed. Yearly breakdown showed 512, 1269, 1035 and 637 isolates from AMR surveillance in the years 2004, 2009, 2012 and 2014 respectively while 63, 207, 30, 69, and 215 isolates were reported from OHRC from 2009 to 2013 respectively. AMR surveillance showed increase in proportion of *S. Paratyphi A* from 29% to 50% from 2004 to 2012, which dropped to 34% in 2014. At OHRC, *S. Paratyphi A* remained the major serotype (60%) from 2009-2014. Majority of the isolates were from male (60%) and highest incidence (26%) in children aged 0-14 years was observed from AMR survey in 2004. In 2009 and subsequent years it shifted to the age group 15-29 years (28%). Typhoid cases were recorded all round the year with peaks during May to August. Resistance to classical agents (Ampicillin-Chloramphenicol-Cotrimoxazole) dropped from 4% in 2004 to 0.6% in 2014, whereas that of Nalidixic acid (NA) increased from 8% to 94% from 2004-2014. In-vitro resistance to Ciprofloxacin emerged in 2009 (10%) which increased to 80% in 2014.

Conclusions: *S. Typhi* and *S. Paratyphi A* are equally implicated in enteric fever in Nepal. Classical agents showed good in-vitro activity against typhoidal salmonellae. Decreasing susceptibility to NA and Ciprofloxacin raises concern on typhoid treatment practice in the country.