

Epidemic Typhoid among Nurses

Study in a Medical College

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During August and September, 1982, an outbreak of typhoid fever occurred in a medical college campus in north India. Illness was confined to Nursing students residing in one hostel. Fifty one (12%) of the residents were confirmed on laboratory examination to have *Salmonella typhi* phage type A, biotype 1 in their stools or/and in blood. There were no deaths. Epidemiological as well as laboratory evidence suggested a single common source for the outbreak. Twentyfour per cent of hostel residents who three weeks prior to their illness ate from the hostel kitchen reported ill compared to 2.6 per cent who ate from other eating facilities within the campus (P 0.01).

TYPHOID fever remains a major public health problem in the developing countries because of prevalent unsanitary conditions and poor socio-economic situation (1-4). Outbreaks following contamination of water and food are not uncommon, but they may often go unreported. In 1942, an epidemic of Typhoid fever occurred in a Medical College campus in a north Indian city which was confined only among residents of one of the 5 hostels on the campus. The present report describes this epidemic which to the best of our knowledge is the first report from India of typhoid fever occurring on a medical college campus.

Background

On August 15, 1982, a previously healthy 20-year old female Nursing student was seen in the emergency room of the hospital with complaints of fever and a bout of vomiting. Her temperature was 104°F. Blood slide for malaria was obtained from her and she was given presumptive treatment for malaria. However, her fever continued forcing her to make a second visit to the Emergency room after two days. Due to persistent fever and nausea, she was admitted to the hospital where typhoid fever was diagnosed on stool examination which revealed *Salmonella typhi*. Meanwhile, another student from the same hostel was hospitalized with similar signs and symptoms, and was similarly diagnosed as having typhoid fever. Subsequently when many more students from the same hostel started reporting sick of fever, vomiting, pains and aches, the hostel was declared as having an outbreak of typhoid fever. The persons were isolated in the hostel and were cared for in their rooms by the hospital staff.

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Methods

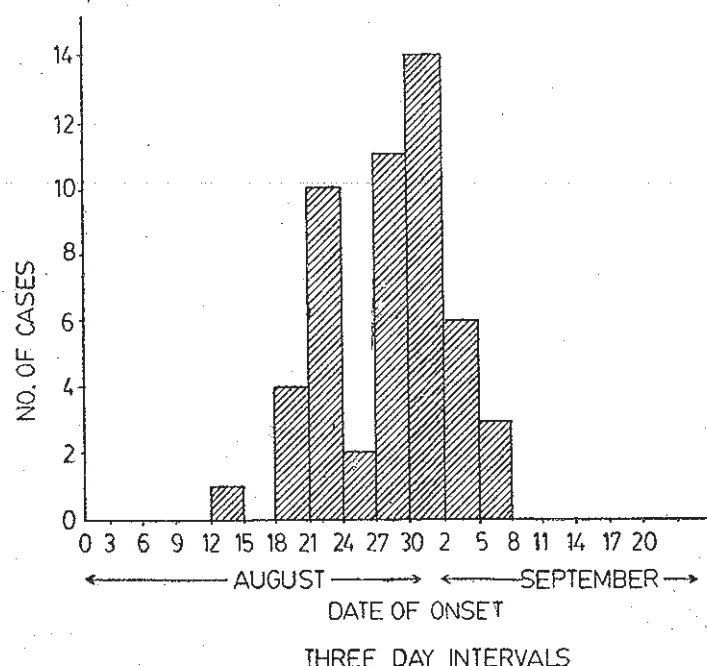
To find out the nature of the epidemic and its mode of spread, sick residents were interviewed on a semi-structured questionnaire. The proforma was so designed as to collect information on date of onset of present illness, and the duration, past episode of typhoid and TAB vaccination, living and eating place and foods consumed 1-3 weeks prior to onset of illness. Hostel records were checked to find out the number of persons residing in the hostel, physical facilities of the hostel including placement of residents in rooms/hostels. Water storage, sewerage system were also examined for any breakdown. History of illness among servants working in the kitchen and dining rooms were obtained. Stool examination and serology on all residents who complained of mild headache, low grade fever or nausea were accomplished by the microbiology department of the hospital. However, for the purpose of analysis, only those residents who were bacteriologically confirmed as having typhoid fever were considered as confirmed cases. Water samples from hostel water taps, tanks and coolers were tested for bacteriological contamination.

Results

Between August 15, and September 8, 1982, 51 (12%) of total 417 persons residing in the hostel facilities became ill with fever, bodyache and gastrointestinal symptoms and were bacteriologically confirmed to have had typhoid fever. Maximum number of cases were recorded between 30th August to 1st September just about middle of the epidemic period (Figure). All patients were female nursing students between the age of 17 and 56 years (mean 26). There were no deaths. All the patients were from one of the four hostels of the campus. No unusual increase in typhoid fever cases were reported from other hostels of the medical facility or from other parts of the city.

Laboratory reports showed that *Salmonella typhi* isolated from stool or blood of 51 patients were of the phage type A, biotype 1. The isolate was sensitive to both ampicillin and chloramphenicol. Serum samples were obtained from first 35 cases only. Paired Sera from 2 patients showed a four fold or greater change in antibody titre against *S. typhi*. All 33 cases with single acute serum specimen had a titre of 1:160 against both antigen H and O. In addition to laboratory confirmed cases, there were 23 persons who complained of fever and/or bodyache but from *S. typhi* could not be isolated. They were however not included in further analysis.

Typhoid fever cases in a medical college campus by date onset, North India, Aug.-Sep., 1982.



Distribution of ill and non-ill hostel residents according to whether they ate from the common kitchen, 1982.

	NUMBER OF		Attack rate (%)
	Ill	Not ill	
Ate from the kitchen	43	140	24.3
Did not eat	6	226	2.6
Total	51	366	12.2

Difference in attack rate between those who regularly ate vs those who did not, $P < 0.001$.

Clinical symptoms reported by patients included fever and bodyache (100%), vomiting (60%), headache (52%), abdominal cramps (46%) and nausea (30%). Other complaints were distention, constipation, chest pain etc. They were all treated with antibiotics and none had a relapse. However, each patient lost 16 work days (range 10-20) due to the illness. Although none of the patients gave a history of past episode of typhoid, two of them had TAB vaccination within the past 12 months and another 10 had TAB vaccination within past 5 years.

Many residents of the affected hostel had attended a picnic on August 18 and 19. No significant difference was found in attack rate among those who attended picnic (21 of 148=14.2%) versus those who did not (30 of 209=11.1%). However, 24.3% residents who ate from hostel kitchen and 2.6% of those

who did not eat in this hostel mess became ill. This difference is statistically significant ($P < 0.01$, Table). This significant difference between two groups persisted even after restricting analysis of ill and non-ill persons within the particular hostel thereby standardizing by residence. This role of specific foods in the spread of infection however could not be examined because of the difficulty in recall about foods consumed due to non-availability of foods from the kitchen which could have been the source of infection. No other activity was significantly different between ill and non-ill persons.

Bacteriological examination of stool from food handlers of the mess did not reveal any carriers. Although two hostel residents and one servant of the adjoining mess gave history of having typhoid fever within 6 months before the outbreak began, bacteriological examination of their stool gave negative results. Tap and cooler water used in the hostel was also examined in the laboratory but they were free from bacterial contamination.

Discussion

This report documents an outbreak of typhoid fever among Nursing students residing in a medical college campus. In developing countries, outbreaks similar to this are neither new nor unusual. Majority of these either go unreported or no investigations are conducted. They, like other diarrhoeal diseases, are often considered a way of life and the increased occurrence of such incidents especially during rainy season are not entirely unexpected by the population at large. The economic impact of these outbreaks cannot be underestimated because each patient lost upto 20 work days due to illness during this outbreak.

The outbreak was localized only to one of the five hostels in the medical college campus where residents ate from a common kitchen. There were not reports of unusual increase in the number of cases from other parts of the city or from other hostels in the campus. Our observations suggest that food from kitchen of one of the hostel messes in the campus was the likely source of infection in this outbreak. Spread to this hostel from outside the campus either through water supply or from eating establishments therefore is unlikely. Further, examination of hostel water supply for faecal coliforms indicated that water source was free of bacterial contamination. Moreover, significantly higher attack rate among residents who ate from the hostel kitchen located in one particular hostel compared to those who did not eat there indicates that food served in the 'mess' was responsible for the illness. The specific food item responsible for infection could not however be implicated because of the difficulty of recall of specific foods eaten during the 3 weeks (incubation period of typhoid fever) prior to onset of illness.

Our findings like those of others suggest that those who eat from a common eating facility are at a greater risk of contracting typhoid fever (5-7). Contamination of food by a case of typhoid fever or a carrier

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Severity of Typhoid and Susceptibility

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who handles food is likely to spread infection to the clients (7, 8). Although identification of such a person retrospectively is often difficult, Vi antigen studies are helpful in identifying a chronic carrier (9). How the food served from the kitchen prior to this outbreak became contaminated remains undetermined. The fact that cases were clustered together in time indicates towards a short period of exposure. The possibility that a carrier might have worked in the kitchen for a short period coinciding with the exposure period is possible. Although none of the cooks or food handlers had been newly hired and none of those who worked excreted the salmonella organism at the time of outbreak. Consumption of food items such as dairy products contaminated when purchased also appears unlikely because all such products were bought from a common supplier who also supplied to other eating establishments in the campus.

Severity of typhoid fever depends upon the susceptibility of the individual to infection and dose of infective organisms consumed (10,11). This might have been the reason why not all persons who ate from the hostel kitchen became ill. Since the food-handlers in the kitchen typically work with all food items, multiple food items would have been contaminated. In addition, there are ample opportunities and conditions that permit *S. typhi* to multiply in the food so that some samples may have had high bacterial counts. Consumption of such samples by those who became ill would explain why others did not become ill. In addition, the incubation period of typhoid fever is inversely related to the size of inoculum (11).

This outbreak is a reminder that typhoid fever can occur in an epidemic form and can cause increased morbidity among affiliated persons. It can be a severe disease as the patients in this outbreak lost an average of 16 work days due to their illness. Improved personal hygiene in the kitchen, and timely and proper

antimicrobial treatment of food handlers who might harbour *S. typhi* should prevent similar outbreaks in the future.

References

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Plea for Better Deal to Nurses

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Other Allowances for Mizoram

- (a) Two months' pay extra in lieu of the extra hours the nurses work, i.e., 116 hours more than other employees.
- (b) Risk Allowance of 40% of basic pay.
- (c) Outfit allowance : Rs. 1000/- per annum and Rs. 100/- per month.

- (d) Special Night Duty allowance.
- (e) Students' stipend of Rs. 500/- per month plus Uniform Allowance, same as for trained nurses.

We would request the concerned authorities, through your good offices, to consider the above mentioned justified problems of the Nurses sympathetically and favourably and take corrective actions so that the discrepancies and anomalies are removed and the issues that have not been considered by the Pay Commission attract appropriate action in the respective fields.

September 3, 1986