

# Typhoid Fever in Rural Haiti<sup>1</sup>

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*A review was made of the clinical characteristics and evolution of all patients over 14 years old with typhoid fever who were treated at the Albert Schweitzer Hospital in Haiti from January 1989 through July 1991.*

*Two hundred and seventeen patients were studied. Their most common symptoms were fever (100%), diarrhea (64.1%), and abdominal pain (51.2%). Splenomegaly and hepatomegaly were rarely noted. Sixty-eight patients (31.3%) were lost to follow-up, 129 (59.4%) were cured, and 20 (9.2%) died. There was a tendency for patients who were ill longer before seeking medical assistance to experience higher mortality. The data also indicate that patients with central nervous system involvement had a less favorable prognosis than other patients.*

*Overall, the high incidence of hospital-reported cases (74 cases per 100 000 inhabitants) shown by these and other data makes it clear that typhoid fever is a highly prevalent infection in rural Haiti. At present, it appears that the only hope for effectively controlling the disease is by educating the population at risk, not only to prevent the disease but also to seek early medical assistance after becoming infected. Typhoid fever patients with a long history of illness before consultation may have a less favorable prognosis than other patients and should be kept under close observation. In addition, any suspected typhoid fever patient with signs of central nervous system involvement should be treated promptly with high-dose steroids, besides receiving an adequate antibiotic regimen.*

**T**yphoid fever is a common infection in areas with poor sanitation. However, its clinical presentation and course show great variation in different geographic locations (1). Haiti is a developing country where three-quarters of the rural population has no access to safe drinking water (2). The Albert Schweitzer Hospital, located in central Haiti's Artibonite Valley, serves a district of 180 000 inhabitants. Typhoid fever is the second most common diagnosis of patients admitted to the hospital's medical ward (3). This article describes the clinical presentation and evolution of typhoid fever among adult patients diagnosed with

this problem at the Albert Schweitzer Hospital.

## MATERIALS AND METHODS

The hospital laboratory's register was searched for all *Salmonella typhi*-positive blood cultures obtained from patients 14 years of age or older during the period January 1988–July 1991. The appropriate medical records were then retrieved and analyzed with respect to each patient's age, sex, days of illness, day of first visit, number of days of hospitalization, signs and symptoms, leukocyte count, hematocrit, treatment, and evolution.

The data were analyzed using an EPI INFO computer program (4). Comparative proportions were evaluated by Chi-square test or Fisher's exact test, and means were evaluated by Student's t test if the variables were homogeneous and normally distributed; when they were not, the Kruskal-Wallis analysis of variance was

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used. P values less than 0.05 were considered statistically significant.

## RESULTS

The aforementioned search yielded 245 patients with positive blood cultures during the study period. Nineteen of these patients were excluded because they were known to be infected with the human immunodeficiency virus (HIV) type I. Nine patients' medical histories could not be located. The remaining 217 patients constituted the study population. This population's mean age was 21.1 years with a standard deviation (SD) of 6.7 years. Nearly all (95%) of the patients were under 33 years old; only 2 (0.9%) were over 40.

Regarding gender, the population included 110 males and 107 females. As Figure 1 indicates, there was no seasonal difference in admission rates; however, for unknown reasons there appears to have been a markedly increased number of hospitalized cases during the period May–July 1991.

Most of the study subjects (183, 84.3%) were correctly diagnosed as having ty-

phoid fever during their first visit. The initial diagnoses recorded for those 34 patients not thought to have typhoid fever are shown in Table 1.

On the average, the subjects were ill 7.4 days (SD 5.2) before consulting a physician. Nearly all (95%) came to the Albert Schweitzer Hospital before their 15th day of illness.

## Laboratory Findings

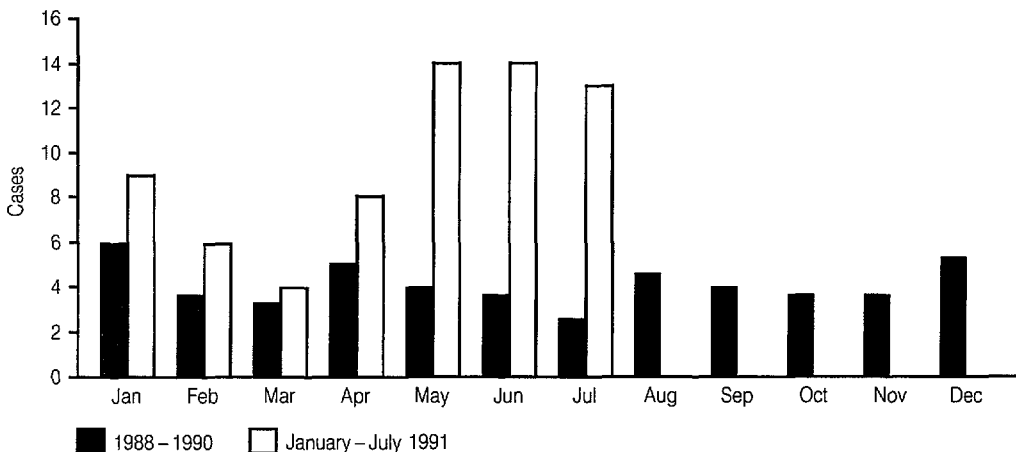
The mean number of leukocytes was 5 760/mm<sup>3</sup> (SD 2 600). One-quarter (25%) of the patients had leukopenia (<4 000/mm<sup>3</sup>), while 6.4% had leukocytosis (>10 000/mm<sup>3</sup>).

The mean result of the hematocrit was 36% (SD 6.0). A fifth (20%) of the patients had hematocrits below 32%.

## Clinical Characteristics

The more common clinical signs and symptoms of our study population and others are shown in Table 2. All 217 of our subjects had fever, but 59 (27.1%) did

**Figure 1.** Monthly numbers of adult typhoid fever cases at the Albert Schweitzer Hospital, January 1988–July 1991. The darker bars show the 3-year averages for each month of 1988–1990 while the lighter bars show the number of cases in each month of January–July 1991.



not complain of either diarrhea or constipation during their first visit.

Other signs, symptoms, and complications noted at the time of the initial

visit or during the course of the infection are listed in Table 3.

## Treatment

The standard course of treatment was 2–4 g of chloramphenicol administered in four divided doses for 2 weeks. Most subjects (195, 89.9%) were treated with this regimen. Ampicillin was given to 12.0% of the subjects, trimethoprim-sulfamethoxazole to 4.6%, and ciprofloxacin to 1.8%. No complications were noted from any of these treatments.

Five patients (2.3%) required surgery.

## Clinical Course

Most (185, 85.2%) of the 217 study subjects were admitted to the Albert Schweitzer Hospital. None of these patients were afebrile before the third day

**Table 1.** Admission diagnoses for 34 patients with typhoid fever in whom the correct diagnosis was not initially suspected.

Diagnoses <sup>a</sup>	No.	(%)
Malaria	19	(55.9)
Gastroenteritis	3	(8.8)
Hepatitis/leptospirosis	3	(8.8)
Pelvic inflammatory disease	3	(8.8)
Urinary tract infection	2	(5.9)
Meningitis	2	(5.9)
Pneumonia	2	(5.9)
Pulmonary edema	1	(2.9)
Anemia	1	(2.9)
Appendicitis	1	(2.9)
Pulmonary tuberculosis	1	(2.9)
Sinusitis	1	(2.9)
Pyomyositis	1	(2.9)
Not stated	2	(6.0)

<sup>a</sup>Some patients had more than one diagnosis

**Table 2.** The case-fatality rate and the most common signs and symptoms of the 217 study subjects with typhoid fever admitted to the Albert Schweitzer Hospital as compared to patients whose histories were analyzed in other studies.

	Country					
	Haiti	India	Nigeria	United States	Nigeria	Singapore
<i>Reference no.</i>		8	15	19	11	12
<i>No. of patients</i>	217	98	38	105	959	370
<i>Signs, symptoms (%):</i>						
Fever	100.0					
Diarrhea	64.1		23.7	57	53	21.0
Constipation	12.0		21.1	10	17	
No diarrhea/ constipation <sup>a</sup>	27.1					
Abdominal pain	51.2		65.8	39		4.0
Vomiting	45.2		50.0	35	46	7.0
Headache	40.6		44.7	59		4.9
Cough	36.1	50.0	55.3	28	26	2.2
Central nervous system involvement	14.7	25.0			>50	
Splenomegaly	0.9	37.8	47.4	42	65	47.0
Hepatomegaly	0.5		21.1	52	24	71.0
<i>Case-fatality rate (%)</i>	9.2	13.3	7.9	0	18	0

<sup>a</sup>A few patients in the Haitian population studied had a history of both diarrhea and constipation; therefore, the sum total of patients with diarrhea plus patients with constipation plus patients without diarrhea or constipation exceeded 100%.

of hospitalization. The average time needed to reach an afebrile state after admission was 5.7 days (SD 1.6 days). Nearly all (90%) of the admitted subjects were afebrile within 1 week of admission.

We considered cured only those subjects who were evaluated after their treatment was completed. Because some physicians did not request an appointment at that time, and also because many patients did not return (even when given an appointment), there was a group of 68 patients (31.3%) with an unknown outcome. Of the remaining 149 with known outcomes, 129 (59.4% of all the study subjects) were cured. Two of the 129 cured (0.9% of all the study subjects) relapsed but were cured after being re-treated.

**Table 3.** Other signs, symptoms, and complications noted during the clinical courses of the 217 typhoid fever cases studied.

Signs, symptoms, complications	No.	(%)
Pneumonia	6	(2.8)
Melena or red blood in stool	6	(2.8)
Dysuria	6	(2.8)
Sore throat	6	(2.8)
Meningismus	5	(2.3)
Ileal perforation	4	(1.8)
Jaundice	3	(1.4)
Low back pain	3	(1.4)
Myalgias	3	(1.4)
Psychosis <sup>a</sup>	2	(0.9)
Hiccups	2	(0.9)
Splenomegaly	2	(0.9)
Hepatomegaly	1	(0.5)
Rhinorrhea	1	(0.5)
Acute respiratory distress syndrome	1	(0.5)
Renal failure	1	(0.5)
Pain in buttocks	1	(0.5)
Paresthesias in arms	1	(0.5)
Hemorrhage in psoas	1	(0.5)
Urinary retention	1	(0.5)
Abortion	1	(0.5)
Premature delivery	1	(0.5)

<sup>a</sup>One patient became transiently psychotic during convalescence.

Twenty (9.2% of the study subjects) died. In all cases, death occurred from 0 to 13 days after hospitalization, the average time to death being 3.8 days (SD 3.6 days). Over half (55%) of those who died did so within 48 hours of admission.

The number of *S. typhi* carriers could not be estimated because routine stool cultures were not obtained at follow-up.

Clinical characteristics and common symptoms of the 129 patients who were cured and the 20 who died are compared in Table 4.

## CONCLUSIONS AND RECOMMENDATIONS

Typhoid fever occurs throughout the year in our area, affecting mostly children and young adults. As noted earlier, we found that 95% of our study subjects were below age 33, despite the fact that all children below age 14 were excluded, and that the infection was very rare in subjects over 40. It is worth noting that during the period of the study reported here, 395 typhoid fever cases were diagnosed at the Albert Schweitzer Hospital in children 0–13 years old. In a similar vein, a study from the same institution of patients with typhoid perforation showed that more than 90% of these patients were under 20 years of age (5).

These figures provide a basis for estimating the yearly incidence of typhoid fever cases in the district served by the Albert Schweitzer Hospital at roughly 74 cases per 100 000 population. This incidence is almost 10 times higher than the 1979 typhoid fever incidence estimated for the Caribbean Region by the World Health Organization (6). If one also considers that the true incidence of typhoid fever cases in endemic areas is thought to be more than 10 times the incidence of cases reported by hospitals (7), it is easy to see that the WHO goal of providing safe and adequate water supply

**Table 4.** Characteristics of patients with typhoid fever who were cured (N = 129) and who died (N = 20).

Characteristics	Patients cured	Patients who died
Days ill before consultation (mean $\pm$ SD)	7.0 $\pm$ 4.3	12.0 $\pm$ 10.9
Typhoid fever was first diagnosis, No. (%)	108 (83.7)	16 (80.0)
Fever (mean $\pm$ SD)	39.7 $\pm$ 0.7	40.2 $\pm$ 0.7
Leukocytes (mean $\pm$ SD)	5 870 $\pm$ 2 640	5 050 $\pm$ 2 700
Hematocrit (mean $\pm$ SD)	36.8 $\pm$ 5.7	32.2 $\pm$ 6.8
Vomiting, No. (%)	59 (45.7)	7 (35.0)
Headache, No. (%)	51 (39.5)	1 (5.0) <sup>a</sup>
Diarrhea, No. (%)	87 (67.4)	16 (80.0)
Constipation, No. (%)	15 (11.6)	3 (15.0)
Abdominal pain, No. (%)	71 (55.0)	13 (65.0)
Central nervous system involvement, No. (%)	12 (9.3)	12 (60.0) <sup>b</sup>
Surgery, No. (%)	2 (1.5)	2 (10.0)

<sup>a</sup>p < 0.05; odds ratio 12.4.

<sup>b</sup>p < 0.05; odds ratio 0.07.

and sewerage systems worldwide by 1990 (6) stands far short of realization in Haiti.

Typhoid fever is an infection with numerous clinical manifestations that can vary greatly (8–12). The most striking difference between the common signs and symptoms found in our study as compared to others is that very few patients were found to have either hepatomegaly or splenomegaly (see Table 2). The fact that ours was a retrospective study can only partly explain this finding.

Regarding other signs and symptoms, the lack of rose spots in our patients is not surprising in view of their dark skin color. Although some authors have found diarrhea relatively infrequent and constipation more common in this infection (13), nearly two-thirds (64.1%) of our patients complained of diarrhea. An acute abdomen requiring surgery occurred in five patients (2.3%), and this was due to ileal perforation in four of the five. This complication has been reported in 2.5%–10% of typhoid patients elsewhere (10, 14–17).

Despite the availability of chloramphenicol, the case-fatality rate of typhoid

fever has remained fairly high in many developing countries (7). Our hospital case-fatality rate of 9.2% is a good example of this situation.

When we compared the patients who were cured with those who died, we found only two ways in which the two groups differed in a statistically significant manner. Specifically, the cured patients had a higher rate of reported headache, a difference that can be easily explained by the fact that this group was less seriously ill and therefore more able to describe subjective symptoms. Also, the patients who died had a higher rate of central nervous system involvement (manifested by an abnormal state of consciousness: lethargy, delirium, stupor or coma); this poorer prognosis of patients with CNS involvement has also been noted by other authors (16–18).

In addition, although the difference was not statistically significant, the cured patients tended to have been ill a shorter time before consultation than those who died. To examine this matter further, we reanalyzed the members of these two groups according to whether or not they

had been ill more than 7 days before consultation. We found that of those ill more than 7 days before consultation, 79% were cured and 21% died ( $p = 0.04$ ). When we grouped the patients with central nervous system involvement according to whether they had been ill more or less than 7 days before consultation, we found a trend (not statistically significant) toward higher mortality among those with a longer illness (6 deaths per 12 patients, versus 2 deaths per 12 patients for those with a shorter period of illness).

Regarding countermeasures, short treatment with high-dose steroids has proven beneficial in managing patients with severe typhoid fever (19). Of the 20 patients who died in our population, 14 (70%) did so without having received steroids.

It also seems clear, however, that typhoid fever is a highly prevalent infection in rural Haiti. As long as the area's socioeconomic and sanitary conditions do not improve markedly, the only hope for effectively controlling the disease is education of the population at risk, not only about how to prevent the disease but also about the need to seek early medical assistance after becoming infected.

Regarding treatment, we propose that any patient in rural Haiti with suspected typhoid fever who has signs of central nervous system involvement should be treated promptly with high-dose steroids, in addition to receiving an adequate antibiotic regimen. Also, patients with a long history of illness before consultation may have a less favorable prognosis and should be kept under close surveillance.

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### *Clinical Trial Focuses on Women's Health*

The National Institutes of Health of the United States of America has begun enrolling participants in the Women's Health Initiative (WHI), a 15-year study that will include over 160 000 women between the ages of 50 and 79. This largest-ever U.S. clinical trial will eventually enlist the collaboration of 45 clinical centers across the country—16 vanguard centers now recruiting study participants and 29 centers to be chosen next year.

In the past, clinical research has concentrated mainly on white, middle-class men and paid too little attention to diseases that are unique to or more common among women. This study will focus on the determinants and prevention of the major causes of disability, frailty, and death in postmenopausal women: breast cancer, colorectal cancer, coronary heart disease, and osteoporosis. The WHI will recruit minorities in numbers equal to or greater than their proportions in the U.S. population.

The WHI consists of three major components: a controlled clinical trial of three promising but unproven approaches to prevention (adherence to a low-fat diet, hormone replacement therapy, and calcium plus vitamin D supplementation); a prospective observational study to identify predictors of disease; and a study of community health promotion approaches for women. For more information, contact Ms. Nancy Morris, WHI Program, National Institutes of Health, Federal Building, Room 6A09, Bethesda, MD 20892; telephone (301) 402-2900.

*Source:* From the National Institutes of Health: largest US clinical trial ever gets under way. *JAMA* 1993;270(13):1521.