has ominous genetic implications while thanatophoric dwarfism is a reflection of dominant mutation(7).

The etiology of thanatophoric dwarfism remains unknown. In our case, mother's 'TORCH' test was positive for rubella and CMV antibodies but role of these infections in the etiology needs to be confirmed by further studies. Because of a small thoracic cage capacity and hypoplastic lungs, early respiratory distress is the cause of death in this condition.

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Typhoid Fever Before Two Years of Age

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Typhoid fever continues to remain a major public health problem in developing countries like India, causing significant morbidity. The clinical pictures of the disease in infants and young children is variable and nonspecific. The disease is usually severe and recovery is delayed(1).

There are many reports of typhoid fever in young children and the incidence below the age of five years is 13.5 to 60% of all typhoid cases in the pediatric age group(1-7). But there is hardly any information on the clinical profile and outcome of this disease in children below 2 years of age. Therefore, this study was planned to examine the clinical profile of typhoid fever in cases less than 2-years-old.

Material and Methods

Eighteen children below the age of two years, suffering from typhoid fever admitted to pediatric ward of Holy Family Hospital, New Delhi over a period of 14 months (June 1990 to July 1991) were studied and their clinical details analyzed.

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The diagnosis of typhoid fever was made on the basis of clinical features and a positive blood culture for *Salmonella typhi*. Widal test was also performed and considered to be positive, when T 'O' and T 'H' titres were greater than or equal to 1:160. Complete blood counts, peripheral smear for malarial parasite, *X*-ray chest, urine and stool examination (routine and culture) were also done. Other relevant investigations (liver function tests, cerebrospinal fluid examination) were performed, wherever indicated.

Results

During 14 months period, 25 children (below two years) were admitted with a diagnosis of typhoid fever. Out of them, 18 were blood culture positive for *Salmonella typhi* and were included in this study. This group represented 13.1% of total culture positive typhoid cases below the age of 12 years, admitted to the ward. The male to female ratio was 2:1, with the mean age of 16.7 months (range 9-24 months). None of the patients had received typhoid vaccination prior to the disease. The clinical features and complications are shown in *Tables I* and *II*.

The total leukocyte count was normal in 13 (72.2%) patients, 3 (16.7%) had leukopenia (leukocyte count below 6000/cu mm), and 2 (11.1%) showed counts above 15000/cu mm. Mild to moderate anemia (hemoglobin level 5-10 g/dl) was seen in 11 cases. The Widal test was positive in nine (50%), and chest *X*-ray revealed bronchopneumonia in six (33.3%) cases. None of the children had evidence of hepatitis, gastrointestinal complications (hemorrhage/perforation), endotoxic shock or myocarditis. Cerebrospinal fluid examination was normal in all patients, who presented with altered sensorium or convulsions.

Twelve out of 18 isolates of *Salmonella typhi* were resistant to all the four conventional drugs (ampicillin, amoxycillin, cotrimoxazole and chloramphenicol). All the isolates were sensitive to cephazoline, cefotaxime and ciprofloxacin. In seventeen cases the organisms were sensitive to norfloxacin, nalidixic acid, gentamicin, amikacin, sisomycin and kenamycin. In view of high prevalence of MDRST strains, 15 children received ceftriaxone (50 mg/kg per day in two divided doses) by intravenous route for 14 days. Chloramphenicol was used only when the bacteria were sensitive to the drug (in 2 cases the drug was started from beginning, where culture and sensitivity reports were already available and in 2 cases switched over from ceftriaxone after culture report). In one case, where the diagnosis was not suspected, the child was put on parenteral gentamicin and oral cephalexin; these drugs were later continued as the *Salmonella typhi* isolated was sensitive to them. In another case, where no response was observed with intravenous ceftriaxone even after 7 days, ciprofloxacin was given, to which the child responded well. Nine out of 18 children became afebrile within 5 days of starting specific treatment and another 7 between 6-10 days. The mean time taken for defervescence was 6.11 days (range 4-11 days). The response in the temperature chart was visible after 2-9 days of treatment (mean 4.06 days).

Discussion

The prevalence of typhoid fever below the age of two years in this study was

TABLE I–*Symptoms in Typhoid Fever*

Symptoms		Number (n-18)	(%)
Fever		18	(100.0)
Duration	<1 week	9	(50.0)
	1 - 2 weeks	7	(38.9)
	>2 weeks	2	(11.1)
Pattern continuous		8	(44.4)
	Remittent	5	(27.8)
	Intermittent	5	(27.8)
Gastrointestinal			
Refusal to feed		5	(27.8)
Diarrhea		8	(44.4)
Vomiting		5	(27.8)
Excessive cry		3	(16.7)
Cough		10	(55.6)
Nervous system			
Altered sensorium		1	(5.5)
Convulsions		3	(16.7)

TABLE II–*Clinical Signs and Complications in Typhoid Fever*

Sign/Complication	Number (n = 18)	(%)
Hepatomegaly	11	(61.1)
Pallor	10	(55.6)
Splenomegaly	7	(38.9)
Chest signs (crepitations/rhonchi)	7	(38.9)
Toxic appearance	4	(22.2)
Inflammed pharynx	3	(16.7)
Abdominal distension	2	(11.1)
Altered sensorium	1	(5.5)
Bronchopneumonia	6	(33.3)
Encephalopathy	1	(5.5)

13.1% of all cases in childhood, indicating that the disease is not uncommon in this age group. This is much higher as compared to the reported prevalence of 3.3 and 0.3% in previous studies(4,5), although in a study from Nigeria(1) one third of all cases were below two years. Recently, in a report from Delhi, 20% of all cases were less than 2-years-old(7).

A modified clinical picture has earlier been reported in younger patients(1,5,7, 8), which may partially explain the non-specific clinical features in children below two years in our study. High grade continuous fever was the commonest presentation, as also reported by other workers(4,5,7,8). In majority (50%) of our patients, the dura-

tion of fever was short (less than 7 days), as compared to other studies, where majority of children presented with fever of 1-2 weeks duration(4,5).

Nonspecific symptoms including diarrhea, vomiting and refusal to feed were commonly observed, as is reported in previous studies(1,2,4,5). Hepatomegaly was more common than splenomegaly in the present study, in contrast to previous studies conducted in young children(4-6), where the reverse was found true. One third of our children had radiologically proven bronchopneumonia; this is much higher than the reported incidence in previous studies(6,7). Other complications were uncommon. Though mortality rate up to 18% has been reported in pediatric age group(1,4,8), none of our children died.

There are reports of increasing incidence (10-50%) of multi drug resistance *Salmonella typhi* (MDRST) strains in the pediatric age group(6,9,10). Our study revealed a significantly high incidence of MDRST (66.6%) in children below 2 years of age. Recently, in a study from Delhi, all the children below two years were infected with MDRST strains(7).

This study shows that enteric fever is not uncommon in children below two years of age. The presenting features are often nonspecific and findings equivocal. A high index of suspicion is necessary, in order to make an early diagnosis. In view of a high prevalence of MDRST strains, therapy with cephazoline, cefotaxime, ceftriaxone is recommended. Aminoglycosides (gentamicin, amikacin) or nalidixic acid may be used as alternative drugs. Ciprofloxacin may be kept in reserve for those cases, who are not responding to other drugs, but more detailed and well planned further studies are required before recommending its general use before two years of age. Considering the relatively high prevalence of typhoid fever in children below two years, it is recommended that immunization with a potent typhoid vaccine should begin before two years of age.

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