e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2023; 15(8); 46-51

Original Research Article

Clinico-Demographic and Laboratory Profile of Typhoid Fever in Children Reported to Health Care

Swesh Chandra[1], Debasis kr Samanta[2]

[1]SMO, Department of Pediatrics, Sub Divisional Hospital, Rajgir, District Nalanda, Bihar, India
[2]Senior Resident, Department of Pediatrics, RKM Seva Pratishthan, Kolkata, West Bengal, India

Received: 10-5-2023 Revised: 20-06-2023 / Accepted: 25-07-2023
Corresponding author: Dr. Swesh Chandra
Conflict of interest: Nil

Abstract

Aim: The aim of the present study was to assess the clinical and laboratory profile of typhoid fever in infants and children with possible gender differentiation.

Methods: The present study was a hospital-based, prospective and a cross-sectional study that was carried out at Department of Pediatrics, Sub Divisional Hospital, Rajgir, District Nalanda, Bihar, India for one year on 200 subjects that were selected using purposive sampling technique

Results: Most of the patients were in the age group of 5-15 years (68%) followed by 1-5 years (25%). The signs and symptoms of typhoid fever were analyzed according to age. Most of the symptoms were similar in both sexes. Almost all the signs and symptoms were more common in males as compared to females. Abdominal distention was significantly more in females as compared to males with a p-value of 0.01. Headache, anorexia and irritability were statistically significant symptoms for typhoid fever ($p<0.05$). The most frequently observed signs were abdominal distention, splenomegaly and hepatomegaly. Coated tongue was found only in the age group 5-15. Rose spots were not observed in any of the cases. On the analysis of the signs according to age, there were no significant differences in the frequency of any signs in the three age groups. Relative bradycardia was present in 36 cases in the age group 5-15 and absent in other age groups. Anemia was found in 120 (60%) patients. Mean hemoglobin percentage of all cases involved in the study was 12.4% with SD of 1.5.

Conclusion: Typhoid fever is still a serious public health concern that mostly affects school-age children. Public health measures include the provision of clean water for drinking, proper sanitation, education on the illness and how it spreads, and excellent hygiene habits may be used.

Keywords: Fever, Infants, Typhoid fever, clinical and laboratory profile.

Introduction

Enteric fever is a multi-systemic tropical infectious disease. Causative organisms are Salmonella enterica serotype Typhi (S. typhi) or Salmonella enterica serotype Paratyphi A, B, or C. It is prevalent in most underdeveloped countries, with India having a high disease burden of 214.2 per 100,000 individuals per year. [1] Endemicity in developing countries is attributed to the low standard of living, poor hygiene practices, poor sanitation, contaminated water sources, and lack of universal vaccination. In children, the common age group affected is between five to 19 years, but in some endemic areas of Asia, it is also common in children less than two years. [2] Clinical manifestations are non-specific, which may delay the diagnosis and treatment leading to fatal complications. Presenting complaints vary from mild constitutional symptoms to severe complications involving multiple organs. Clinical suspicion is pivotal for diagnosis. Common presentations are fever, vomiting, diarrhoea, abdominal pain, cough, headache, and lethargy. The gold standard for diagnosis is blood culture, but in 70% the culture is negative due to injudicious use of antibiotics before admission. [3]

Since many hospitals lack capabilities for blood culture and up to 90% of patients with typhoid are treated as outpatients, it is challenging to gather reliable data from which to estimate the incidence of illness in these locations. Public health statistics persistently understate the prevalence of typhoid, according to community-based studies. Recent reports have indicated annual incidence rates of 198 per 100,000 in the Mekong Delta area of Vietnam and 980 per 100,000 in Delhi, India. [4,5] The prognosis is based on how quickly the diagnosis is made and what kind of antibiotics are given. In addition, the patient's age, general health,

and diet are prognosticating variables. Children who are underweight and have treatment resistance are more susceptible. After urinating and before consuming meals, wash your hands thoroughly with antiseptic solution. Despite the high burden of disease, challenges in the diagnosis and management of enteric remain. Clinical diagnosis of enteric fever is nonspecific and mimics other febrile illnesses like malaria and dengue fever and influenza. [6,7] This is particularly true for children who can present with atypical signs and complications such as neurological dysfunction, nephropathy and cardiac abnormalities8,9 and thus lead the clinician away from a diagnosis of enteric fever. Attempts have been made to develop and validate clinical algorithms [10,11], without becoming mainstream for usage in diagnosis.

The aim of the present study was to assess the clinical and laboratory profile of typhoid fever in infants and children with possible gender differentiation.

Materials and Methods

The present study was a hospital-based, prospective and a cross-sectional study that was carried out at Department of Pediatrics, Sub Divisional Hospital, Rajgir, District Nalanda, Bihar, India for one year on 200 subjects that were selected using purposive sampling technique.

The inclusion criteria considered were the infants and children with fever for ≥5 days, those with positive blood culture for S. typhi and/or Widal agglutination test 1:160 or more dilution for O and/or H antigen. Children suffering from other systemic illness like congenital heart disease, tuberculosis, malignancy, terminal stage of any disease or protein energy malnutrition (PEM>Grade 3 as per Indian Academy of Pediatrics classification) [12] or whose guardians refused to give consent were excluded from the study. Detailed history and physical examination for fever, hepatomegaly, splenomegaly, bradycardia, anemia etc. was done according to a pre-designed proforma. Socioeconomic status was graded according to modified Kuppuswamy's scale. [13]

All patients included in this study underwent complete blood investigation to estimate the total and differential leukocyte count, hemoglobin level and serum transaminases (ALT, AST) by using fully automated complete analyzer, Nihon Kohden Ceitac E. Widal test was done by using semi-quantitative tube agglutination (titration) method in patient with history of fever of >7 days duration. The titre of the patient was taken as the highest dilution of the serum sample that gave a visible agglutination. Titre of 1:160 or more dilution for O and/or H antigen was considered positive. Blood culture and sensitivity test was done in all cases by collecting 5 ml of venous blood was and incubated overnight at 37°C in brain heart infusion broth.

All the variables regarding the clinical symptoms, signs and the results of laboratory investigations were recorded and analyzed using SPSS version 17. The findings were tabulated in percentage and mean±standard deviation (SD) was calculated. The statistical analysis using Chi-square was carried out and a p-value <0.05 was considered statistically significant.

Results

Table 1: Distribution of patients according to age and gender

Age group (years)	Gender				Total (n=200)	
	Female (n= 90)		Male (n= 110)			
	No.	%	No.	%	No.	%
Infants	4	4.44	10	9.09	14	7
1-5	10	11.12	40	36.36	50	25
5-15	76	84.44	60	54.55	136	68

Most of the patients were in the age group of 5-15 years (68%) followed by 1-5 years (25%).

Table 2: Distribution of clinical symptoms and signs according to age

Signs and symptoms	Infants	1-5 years	5-15 years	P-value
Pain abdomen	--	12	44	0.4
Headache	--	8	60	0.000
Vomiting	4	14	34	0.4
Constipation	--	10	32	0.5
Diarrhea	8	16	10	0.000
Cough	--	10	16	0.4
Anorexia	--	19	60	0.007
Rose spot	--	--	--	--
Sick looking	8	18	58	0.4
Restless	4	12	20	0.9
Irritable	8	20	16	0.000

Coated tongue	--	--	16	0.4
Abdominal distension	4	24	40	0.2
Abdominal tenderness	--	16	30	0.3
Splenomegaly	8	20	30	0.4
Hepatomegaly	2	24	50	0.8
Icterus	--	6	20	0.5
Cyanosis	0	8	4	0.3
Pallor	0	14	32	0.7

The signs and symptoms of typhoid fever were analyzed according to age. Headache, anorexia and irritability were statistically significant symptoms for typhoid fever ($p<0.05$). The most frequently observed signs were abdominal distention, splenomegaly and hepatomegaly. Coated tongue was found only in the age group 5-15. Rose spots were not observed in any of the cases. On the analysis of the signs according to age, there were no significant differences in the frequency of any signs in the three age groups.

Table 3: Distribution of clinical symptoms and signs according to gender

Signs and symptoms	Male (n= 110)		Female (n= 90)		P-value
	No.	%	No.	%	
Pain abdomen	36	32.72	36	40	0.2
Headache	60	54.54	54	65	0.2
Vomiting	46	41.81	36	40	0.4
Constipation	25	22.72	20	22.22	0.6
Diarrhea	36	32.72	15	16.66	0.2
Cough	14	12.72	18	20	0.5
Anorexia	75	68.18	69	76.66	0.5
Sick looking	75	68.18	63	70	0.6
Restless	28	25.45	9	10	0.2
Irritable	52	47.27	18	20	0.2
Coated tongue	4	3.63	12	13.34	0.1
Abdominal distension	60	54.54	72	80	0.01*
Splenomegaly	60	54.54	48	53.33	0.8
Hepatomegaly	52	47.27	54	60	0.3
Icterus	10	9.09	18	20	0.3
Cyanosis	4	3.63	2	2.22	0.7
Pallor	36	32.72	12	13.34	0.2

Most of the symptoms were similar in both sexes. Almost all the signs and symptoms were more common in males as compared to females. Abdominal distention was significantly more in females as compared to males.

Table 4: Distribution of relative bradycardia in different age group and frequency of anemia

Relative bradycardia	Age			
	Infants	1-5 Years	5-15 Years	
Present	--	--	36	
Absent	14	50	100	
Total	14	50	136	
Anemia	**Frequency**	**Percent**	**Hemoglobin (gm/dl)**	
Present	120	60	**Mean**	**SD**
Absent	80	40	12.4	1.5

Relative bradycardia was present in 36 cases in the age group 5-15 and absent in other age groups. Anemia was found in 120 (60%) patients. Mean hemoglobin percentage of all cases involved in the study was 12.4% with SD of 1.5.

Table 5: Distribution of leukocytosis in different age groups

Age group (years)	Number	% age	P-value
Infants (n=14)	14	100	
1-5 (n=50)	12	24	
5-15 (n=136)	20	14.70	0.004

All of the infants showed leucocytosis whereas only 7 (24%) patients in age group 1-5 and 10 (14.70%) in age group 5-15 had leucocytosis, which was statistically significant with p-value of 0.004. Leucopenia was not observed in any patient.

Table 6: Differential leukocyte count in different age group

Age group (years)	Mean neutrophil	Mean eosinophil	Mean basophil	Mean monocyte	Mean lymphocyte
Infants	62.4	2	--	0.2	28
1 to 5 years	63.7	0.7	0.2	0.8	34.6
5 to15 years	66.4	1.7	0.1	0.8	32.4

The above table depicted differential leukocyte count in different age groups.

Discussion

Typhoid fever is an infectious disease caused by gram negative bacteria Salmonella enteric serovar typhi (S.typhi). In developed countries, the incidence of typhoid fever is less than 15 cases per 100,000 populations, with most cases occurring in travelers; whereas in developing countries the estimated incidence rate ranging from 100-1,000 cases per 100,000 populations. [14] It is endemic in developing countries where water supplies and sanitation are sub-standard. [15] Humans are the only natural reservoir of the organism. Direct or indirect contact with an infected person is a prerequisite for infection. The infected person sheds the bacteria in stool and urine. Ingestion of food or water contaminated with S. typhi from human feces is the most common mode of transmission. [16]

Most of the patients were in the age group of 5-15 years (68%) followed by 1-5 years (25%). In present study, male predominance was seen. Similar results were reported in other studies. [17-20] The signs and symptoms of typhoid fever were analyzed according to age. Headache, anorexia and irritability were statistically significant symptoms for typhoid fever ($p<0.05$). The most frequently observed signs were abdominal distention, splenomegaly and hepatomegaly. Coated tongue was found only in the age group 5-15. Rose spots were not observed in any of the cases. On the analysis of the signs according to age, there were no significant differences in the frequency of any signs in the three age groups. This was similar to studies conducted by Raj C [21], Chandrashekhar et al [22] and Gosai et al. [23] In this study, headache was significantly more common in age group of 5-15 years which was comparable to studies conducted by Lefebvre et al [24], Joshi BG et al25 and Khan et al. [26] Most of the symptoms were similar in both sexes. Almost all the signs and symptoms were more common in males as compared to females. Abdominal distention was significantly more in females as compared to males. On the analysis of the signs according to age, there were no significant differences in the frequency of any signs in the three age groups. Anemia was found in 55 (55%) patients. Mean hemoglobin percentage of all cases involved in the study was 10.5% with SD of 1.7. Most of the studies observed more leucopenia than leucocytosis. [23,25]

In the under two year age group, the incidence of 10.7% highlights the importance of early immunization required for prevention of the disease and also supports the findings by Verma M et al. and Saha et al. [27,28] Another study from Dhaka, Bangladesh by Hyder et al. was done exclusively on children under two years. They detected 40 cases in a span of 10 months despite popular belief that enteric fever is a rarity in this age group. [29] Relative bradycardia was present in 36 cases in the age group 5-15 and absent in other age groups. Anemia was found in 120 (60%) patients. Mean hemoglobin percentage of all cases involved in the study was 12.4% with SD of 1.5. The study conducted by Ganesh et al [30] showed relative bradycardia in 15.2% cases seen mainly in children more than 5 years of age, which rightly correlates with the present study. In the present study, leucopenia was not observed which could be due to the fact that almost all the patients who presented to us had taken antibiotics for few days of.

All of the infants showed leucocytosis whereas only 7 (24%) patients in age group 1-5 and 10 (14.70%) in age group 5-15 had leucocytosis, which was statistically significant with p-value of 0.004. Leucopenia was not observed in any patient.

Conclusion

Typhoid fever is still a serious public health concern that mostly affects school-age children. Public health measures include the provision of clean water for drinking, proper sanitation, education on the illness and how it spreads, and excellent hygiene habits may be used. Proper hand washing practises should be taught to food workers, especially in hotels, hostels, and public schools. Moreover, typhoid vaccination and prudent antibiotic administration based on the culture sensitivity pattern will aid in lowering the illness burden.

References

1. Ochiai RL, Acosta CJ, Danovaro-Holliday MC, Baiqing D, Bhattacharya SK, Agtini MD, Bhutta ZA, Canh DG, Ali M, Shin S, Wain J. A study of typhoid fever in five Asian countries: disease burden and implications for controls. Bulletin of the world health organization. 2008 Apr;86(4):260-8.
2. Laishram N, Singh PA: Clinical profile of enteric fever in children. J Evolution Med Dent Sci. 2016, 5:114-116.
3. Rabasa A, Mava Y, Pius S, Timothy SY, Baba UA: Typhoid fever in children: clinical presentation and risk factors. Niger J Paediatr. 2013; 40:60-63.
4. Lin FY, Vo AH, Phan VB, Nguyen TT, Bryla D, Tran CT, Ha BK, Dang DT, Robbins JB. The epidemiology of typhoid fever in the Dong Thap Province, Mekong Delta region of Vietnam. The American journal of tropical medicine and hygiene. 2000 May 1;62(5):644-8.
5. Sinha A, Sazawal S, Kumar R, Sood S, Reddaiah VP, Singh B, Rao M, Naficy A, Clemens JD, Bhan MK. Typhoid fever in children aged less than 5 years. The Lancet. 1999 Aug 28;354(9180):734-7.
6. Bhan MK, Bahl R, Bhatnagar S. Typhoid and paratyphoid fever. The Lancet. 2005 Aug 27;366(9487):749-62.
7. Bhutta ZA. Current concepts in the diagnosis and treatment of typhoid fever. BMJ. 2006 Jul 6;333(7558):78-82.
8. Catalano G, Varone GL. Changing pattern of typhoid fever: clinical bacteriological and immunological aspects. Bollettino Dell'istituto Sieroterapico Milanese. 1972 Mar 1;51(2):157-64.
9. Dutta TK, Ghotekar LH. Atypical manifestations of typhoid fever. Journal of postgraduate medicine. 2001 Oct 1;47(4):248.
10. Vollaard AM, Ali S, Widjaja S, van Asten HA, Visser LG, Surjadi C, van Dissel JT. Identification of typhoid fever and paratyphoid fever cases at presentation in outpatient clinics in Jakarta, Indonesia. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2005 Jun 1;99(6):440-50.
11. Hosoglu S, Geyik MF, Akalin S, Ayaz C, Kokoglu OF, Loeb M. A simple validated prediction rule to diagnose typhoid fever in Turkey. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2006 Nov 1;100(11):1068-74.
12. Parthasarathy A et al. IAP Textbook of Pediatrics 3rd Edn. Jaypee Brothers Medical Publishers (P) Ltd: 2006; 120-39.
13. Bairwa M, Rajput M, Sachdeva S. Modified Kuppuswamy's Socioeconomic Scale: Social Researcher Should Include Updated Income Criteria, 2012. Indian J Community Med. 2014; 38:185–6.
14. Zulfiqar Ahmed Bhutta. Enteric Fever (Typhoid Fever). In: Kliegmen RM, Stanton BF, St. Geme JW, Schor NF, Behrman RE, editors. Nelson Textbook of Pediatrics. 20th ed. Philadelphia: Elsevier; 2015. pp 1388-93.
15. Hetal N. Jeeyani, Baldev S. Prajapati, Afroz Bloch. Enteric Fever in Children-Clinical profile, sensitivity patterns and response to antimicrobials. GCSMC J Med Sci. 2015; 4(1): 40-3.
16. B. Prajapati, GK. Rai, SK. Rai, HC. Upreti, M. Thapa, G. Singh, RM Shrestha. Prevalence of Salmonella typhi and paratyphi infection in children, a hospital-based study. Nepal Med Coll J. 2008;10(4):238-44.
17. Mithilesh S, Raju G. Pediatric nature of enteric fever with emerging antibiogram: a cross sectional study. Int J Pediatr Res. 2018;4(2).
18. International Journal of current Microbiology and Applied Sciences. 2015;4(12):541-7.
19. Devaranavadagi RA. A study on clinical profile of typhoid fever in children. Int J Contemp Pediatr. 2017;4(3);1067-107.
20. Mehul MG, Hareshwaree. BH, Payal HP, Abeda. GM. A study of clinical profile of multidrug resistant typhoid fever in children. NJIRM. 2011;2(3):87-90.
21. Raj C. Clinical profile and antibiotic sensitivity pattern of typhoid fever in patients admitted to pediatric ward in a rural teaching hospital. Inte Jour of Medi Res & Health Sci. 2014;3(2):245-8.
22. Chandrashekar A, Sodhi K, Dalal S.S. Study of clinical and laboratory profile of enteric fever in pediatric age group. International Journal of Basic and Applied Medical Sciences. 2013; 3(3):16-23.
23. Gosai M, Hariyani B, Purohit H, Momin G. A study of clinical profile of multidrug-resistant typhoid fever in children. NJIRM. 2011;2(3): 87-90.
24. Lefebvre N, Gning SB, Nabeth P, Ka S, Ba-Fall K, Rique M et al. Clinical and laboratory features of typhoid fever in Senegal. A 70-case study. Med Trop (Mars). 2005;65(6):543-8.
25. Joshi BG, Keyal K, Pandey R, Shrestha BM. Clinical profile and sensitivity pattern of Salmonella serotypes in children: A hospital-based study. J. Nepal Paediatr Soc. 2011;31 (3):180-3.
26. Khan M, Soofi S, Ochiai R, Khan M, Sahito S, Habib M, Puri M et al. Epidemiology, clinical presentation, and patterns of drug resistance of Salmonella Typhi in Karachi, Pakistan. J Infect Dev Ctries. 2012;6(10):704-14.
27. Verma M, Chhatwal J, Saini V, Singh T: Enteric fever below 2 years of age. Indian Pediatr. 1996, 33:229-30.

28. Saha SK, Baqui AH, Hanif M, et al.: Typhoid fever in Bangladesh: implications for vaccination policy. Pediatr Infect Dis J. 2001; 20:521-4.
29. Hyder RT, Yasmeen BN, Ahmed S, Islam MS, Islam F: Clinical profile and outcome of enteric fever in hospitalized children aged 6 months to 2 years. North Int Med Coll J. 2013, 5:301-305.
30. Ganesh R, Janakiraman L, Vasanthi T, Sathiyasekeran M. Profile of typhoid fever in children from a tertiary care hospital in Chennai-South India. Indian J Pediatr. 2010; 77(10):1089-92.