

BLOOD MORPHOLOGY IN PATIENTS SUFFERING FROM ENTERIC FEVER.**Dr. Mohammad Sajjad***

Associate Professor, Pathology Deptt. Bannu Medical College Bannu Kpk Pakistan.

Corresponding Author: Dr. Mohammad Sajjad

Associate Professor, Pathology Deptt. Bannu Medical College Bannu Kpk Pakistan.

Article Received on 06/02/2017

Article Revised on 27/02/2017

Article Accepted on 20/03/2017

ABSTRACT

OBJECTIVE: To study peripheral blood morphology in patients suffering from enteric fever in Pathology Deptt, Khalifa Gul Nawaz Teaching Hospital Bannu. Khyber Pakhtun Khwa. Pakistan. This was one year study from January 2015 to December 2015. **MATERIALS AND METHODS:** This descriptive cases series study in which total of 96 enteric fever patients were included. All these patients were suffering enteric fever, diagnosis was made on the basis of widal test with titre $\geq 1/320$ in association with clinical findings. Venous blood was collected in EDTA tubes and plain tubes from all these patients and used for complete blood counts performed by manual method using Sahli's hemoglobinometer and Neubauer's chamber as well as hematology analyzer cell dyne/ruby. The plain tube blood was used for widal tests. **RESULTS:** A total of 96 patients were enrolled in this study. The age range was from 12-55 years with mean age of 24.22 ± 10.2 years. Male were 57 and female were 39, male to female ratio was 1.46:1. Anemia was found in 65 (67.70%) cases followed by thrombocytopenia 33 (34.37%) cases, leukocytosis in 13 (13.54%) cases and leucopenia in 7 (7.29%) cases. Most of the patients were in the age range of 21-30 years 58 (60.41%) followed by 31-40 years 23 (23.95%). In 65 anemic patients the hemoglobin level was from 4.5 gm/dl to 10.0 gm/dl, where as in 33 thrombocytopenic patients the range of thrombocytopenia was from 35,000 to 145,000 /cmm and in 13 leucocytosis cases the total leukocyte count range was from 13500 to 19800/cmm and in 7 cases of leucopenia the total leukocyte count range was from 1300 to 3700/cmm. In three (3.12%) cases pancytopenia was present. **CONCLUSION:** Patients suffering from enteric fever may develop cytopenias leading to significant morbidity and mortality if not diagnosed early in time and treated properly.

KEY WORDS: Enteric fever. Salmonella Typhi. Widal test. Cytopenias.**INTRODUCTION**

Enteric fever is a systemic bacterial infection caused by salmonella typhi, a gram negative rods. Salmonella belongs to a family of enterobacteracea having more than 2300 serotypes. Salmonella typhi have somatic O antigen, flagellar H antigen and capsular Vi antigen and also produces endotoxin. Salmonella are flagellates, encapsulated, facultative anaerobes that ferments glucose and produce little H₂S from carbohydrates. Enteric infection is the leading cause of food and water born infection world wide usually acquired through the ingestion of contaminated water and food materials. The incubation period is 7 to 20 days. Pathogenesis occurs when salmonella reaches the small intestine, enters lymphatics and blood and infects organs likely liver, spleen, kidneys, bone marrow, gall bladder, lungs and heart. After ingestion of the bacteria from contaminated source the bacteria penetrate the mucosa of the small intestine at the distal ileum resulting in asymptomatic bacteremia. The bacteria multiply in the mononuclear phagocytic cells in the liver, spleen, lymph nodes and Peyer's patches of ileum with resulting necrosis and ulceration of the mucosa in terminal ileum. The clinical features include fever first gradual than rises to high

plateau, malaise, headache, myalgia, dry cough, diffuse abdominal pain, first constipation then bloody loose motion, skin rashes, hepatosplenomegaly etc. Diagnosis is by serologic test likely widal and typhidot followed by culture of stool in first week, blood in first and second week and urine culture in second week and onward. Untreated cases may progress to intestinal hemorrhages, perforation, peritonitis, septicemia and death if not treated in time. In developing countries enteric fever is the major health problem, also now increasingly reported from developed countries as well. This disease predominantly affects children and young adults and is the recognized cause of morbidity and mortality world wide with over 12.6 million cases per year and an estimated 600,000 deaths annually. Amongst the total global mortality from enteric fever 80% occur in Asia. In developing countries 1100 cases per 100,000 of population is documented. The course of disease is divided into four phases each lasting a week. In first week the temperature rises slowly with relative bradycardia, malaise, headache and dry cough. In the second week there is prostration with high fever and bradycardia followed by delirium and abdominal rashes in every 3rd patient also abdominal pain with

constipation/diarrhea may occur. Hepatosplenomegaly and positive widal test occur in this week. In the third week complications may develop like intestinal hemorrhage due to ulceration of Peyer's patches. Intestinal perforation is a serious complication in this week and is frequently fatal with consequent septicemia and peritonitis. By the end of third week if no serious complications are there the fever subsides slowly and gradually. In this disease multisystems are involved leading to various complications including hematological complications. Hematological manifestations in form of anemia, leucopenia and thrombocytopenia are well known in enteric fever. The aim of this study was to see the blood morphology in patients suffering from enteric fever.

Blood morphology definition: The following terms are defined as.

Anemia: Hemoglobin less than 10.0 g/dl

Thrombocytopenia: Platelet count less than 150,000/cmm

Leukopenia: Total leukocyte count less than 4000/cmm

Leukocytosis: Total leukocyte count more than 11000/cmm

MATERIAL AND METHODS

This was descriptive case series study performed in Khalifa Gul Nawaz Teaching Hospital Bannu. KPK Pakistan. The study period was one year from January 2015 to December 2015. Sampling technique was convenient (non-probability) sampling. Inclusion criteria was all widal test positive patients with active fever of any age and sex. Exclusion criteria was patients suffering from other known chronic illnesses like tuberculosis or malignancy in association with diagnosed enteric fever. All these patients after an informed verbal consent were

subjected to phlebotomy while observing an aseptic technique. Venous blood 2 ml each in Ethylene diamine tetra acetic acid (EDTA) tube and plain tubes were collected separately. EDTA blood was used for blood complete picture and non EDTA blood was used for widal test. Blood counts were performed both manually as well as confirmed by Cell Dyne/Ruby Abbott. Data collected were recorded on a predesigned proforma for the purpose.

All the studied variables including age, sex, were analyzed for descriptive statistics like frequencies and percentages. All the data was processed by computer program Statistical Package for Social Sciences (SPSS) version 16.

RESULTS

This study of 96 enteric fever patients with mean age of 24.22 ± 10.2 years with age range of 12-55 years. Male were 57 and female were 39, male to female ratio was 1.46:1. Figure I: Most of the patients were in the age group of 21-30 years 58 (60.41%) cases followed by 31-40 years 23 (23.95%) cases. Table I: Anemia was found in 65 (67.70%) cases followed by thrombocytopenia 33 (34.37%) cases, leukocytosis in 13 (13.54%) cases and leucopenia in 7 (7.29%) cases. Table II: In 65 anemic patients the hemoglobin level was from 4.5 gm/dl to 10.0 gm/dl, where as in 33 thrombocytopenic patients the range of thrombocytopenia was from 35,000 to 145,000 /cmm and in 13 leukocytosis cases the total leukocyte count range was from 13500 to 19800/cmm and in 7 cases of leucopenia the total leukocyte count range was from 1300 to 3700/cmm. In three (3.12%) cases pancytopenia was present.

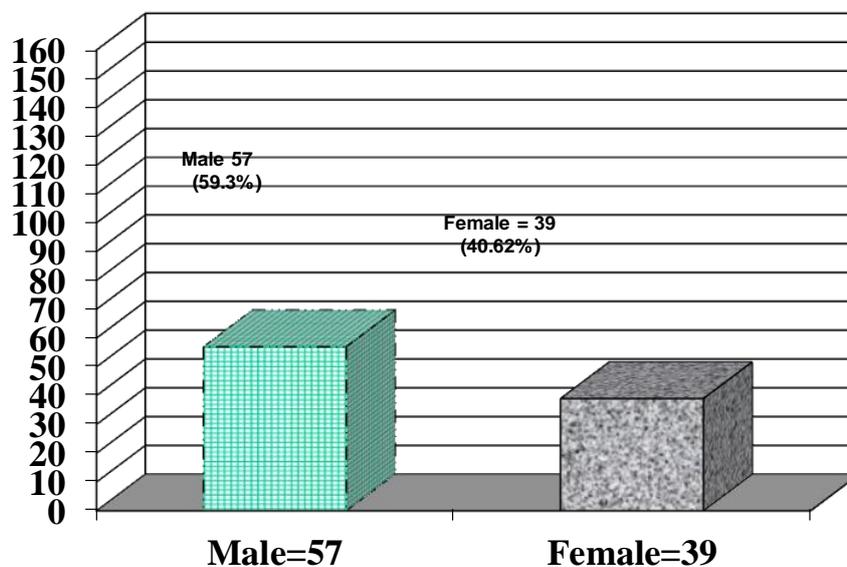


FIGURE I: GENDER DISTRIBUTION OF ENTERIC FEVER PATIENTS (n=96)

TABLE NO. I: AGE DISTRIBUTION OF ENTERIC FEVER PATIENTS (n=96).

S. NO.	AGE GROUP	NO. OF PATIENTS	PERCENTAGE
1	1-10 Years	09	9.37%
2	11-20 Years	35	36.45%
3	21-30 Years	31	32.29%
4	31-40 Years	11	11.45%
5	41-50 Years	7	7.29%
6	>50 Years	3	3.12%
7	Total	96	100%

TABLE NO. II: HEMATOLOGICAL PARAMETERS IN ENTERIC FEVER PATIENTS (n=96).

S. NO.	VALUES	Hemoglobin	WBC count/cmm	Platelets count/cmm
1	Normal	31(32.30%)	76(79.16%)	62(64.58%)
2	High	00(00%)	13(13.54%)	01(1.04%)
3	Low	65(67.70%)	07(7.29%)	33(34.37%)
4	Total	96(100%)	96(100%)	96(100%)

DISCUSSION

Enteric fever is an important public health problem in developing countries like Pakistan. It was estimated that over 2.16 million peoples were affected by enteric fevers in 2000 globally resulting in 216 000 deaths with more than 90% of these occurred Asia. To control enteric fever safe and improved water supply as well as improved personal hygiene is mandatory. Vaccination in high-risk areas is another recommended tool of WHO for control of short term outbreaks. The complex geographical distribution of the disease and variable antimicrobial resistance amongst different peoples needs further consideration to control the disease.

In our study the age range of the disease was from was from 12-55 years with mean age of 24.22±10.2 years. Male were 57 and female were 39, male to female ratio was 1.46:1. In a study conducted by gupta et al the age range was from 2-45 years. In a study conducted by khan et al in 1999 in south africa the mean age was 20.2±12.2 years, male were 46 and females were 56 with male to female ratio of 0.82:1. Another study conducted by abro et al in 2009 in dubai the age range was from 14-51 years with mean age of 28.4±8.7 years, male were 61 and female 14 with male to female ratio of 4.35:1. Still another study conducted by pohen et al in indonesia in 2004 the mean age was 24.98±11.11, male were 49 and female 70 with male to female ratio of 0.7:1. Another study conducted by rana et al in 2015 in nepal male patients were 112 and female were 92 with male to female ratio of 1.21:1.

In our study the common age group affected by enteric fever was 21-30 years 58 (60.41%) cases followed by 31-40 years 23 (23.95%) cases. In a study conducted by rana et al the common age group affected was 20 39 years followed by <20 years. In a study conducted by gupta et al the common age group was 10-20 years with about half of the occurred in this age group.

In this study cytopenia was present in 67.7%, amongst these anemia was found in 65 (67.70%) cases followed

by thrombocytopenia 33 (34.37%) cases, leukocytosis in 13 (13.54%) cases and leucopenia in 7 (7.29%) cases. In three (3.12%) cases pancytopenia was present.

In study conducted by qamar et al in king edward medical college lahore in 2013 cytopenia was found in 98% of enteric fever patients which is the highest cytopenia reported in enteric fever patients, amongst these anemia was present in 61.3%, leucopenia in 52%, thrombocytopenia in 39.3% and thrombocytopenia alone in 2% patients. Another study conducted by abro et al in 2009 anemia was found in 61.3% patients, thrombocytopenia in 40% cases, leukocytosis in 10.6% cases and leucopenia in 4% cases. In a study conducted by rana et al in nepal in 2015 anemia was found in 23.52% cases, thrombocytopenia in 23.52% cases, leucopenia in 7.84% cases, leukocytosis in 2.94% cases and thrombocytosis in 1.96% cases. In khan et al study anemia was reported in 36.27% cases, thrombocytopenia in 40.19% cases and leucopenia in 23.52% cases. Another study conducted by gupta et al in 2009 leukopenia was found in 21% cases, leukocytosis in 2.46% cases, anemia in 10% cases, thrombocytopenia in 14.8% cases and pancytopenia in 4.93% cases.

CONCLUSION

Enteric fever which is a common disease with variable hematological manifestation like anemia and cytopenias if not diagnosed early and treated correctly in time may cause high morbidity and mortality.

REFERENCES

1. Dacie JV, Lewis SM. Practical hematology. Editors: Churchill Livingstone. 10th ed. 2008; 43-8.
2. Ram PK, Naheed A, Brooks WA. Risk factors for typhoid fever in a slum in Dhaka, Bangladesh. Epidemiology and infection 2007; 135: 458-65.
3. Crump JA, Mintz ED. Global Trends in Typhoid and Paratyphoid Fever. Clinical Infectious Diseases 2010; 50: 241-6.

4. Thompson CN, Blacksell SD, Paris DH. Undifferentiated Febrile Illness in Kathmandu, Nepal. *The American Journal of Tropical Medicine and Hygiene* 2015; 92: 875-8.
5. Bhutta ZA. Current concepts in the diagnosis and treatment of typhoid fever. *BMJ (Clinical research)* 2006; 333: 78-82.
6. Parry CM, Wijedoru L, Arjyal A, Baker S. The utility of diagnostic tests for enteric fever in endemic locations. *Expert Review of Anti-infective Therapy* 2011; 9: 711-25.
7. Khanam F, Sayeed MA, Choudhury FK, et al. Typhoid fever in young children in Bangladesh: clinical findings, antibiotic susceptibility pattern and immune responses. *PLoS Negl Trop Dis* 2015; 9: e0003619.
8. Meltzer E, Stienlauf S, Leshem E, Sidi Y, Schwartz E. A Large Outbreak of Salmonella Paratyphi A Infection Among Israeli Travelers To Nepal. *Clinical Infectious Diseases* 2014; 58: 359-64.
9. Dangana A, Ajobiwe J, Nuhu A. Hematological changes associated with salmonella typhi and paratyphi in humans. *Int. J. Biomed. Hlth. Sci* 2010; 6(40): 219-22.
10. Ifeanyi OE. Changes in some hematological parameters in typhoid patients attending university health services deptt of Michael Okpara University of Agriculture, Nigeria. *Int. J. Curr. Microbiol. App. Sci* 2014; 3(1): 670-74.
11. Abro AH, Abdou AMS, Gangwani JL, Ustadi AM, Nadeem JY, Hussaini HS. Hematological and biochemical changes in typhoid fever. 2009; 25(2): 166-71.
12. Qamar U, Aijaz J. Hematological changes associated with typhoid fever. *Rawal Medical Journal* 2013; 38(1): 32-5.
13. Pohan HT. Clinical and laboratory manifestation of typhoid fever at Pershabatan Hospital Jakarta. *Indones. J. Intern. Med.* 2004; 36(2): 78-83.
14. Rana BSJB, Pardhan SK. Hematological parameters of salmonella typhi and paratyphi culture positive patients, from Kathmandu Valley Nepal. *Journal of Institute Medicine* 2015; 37(3): 40-6.
15. Gupta WCS, Handa WCA, Chadha WCDS, Gangoo RK, Panda GCRC. Profile of culture positive enteric fever from Bangalore. *MJAFI* 2009; 65: 328-31.
16. Khan M, Coovadia YM, Conolly C, Sturn AW. Influence of sex on clinical features and laboratory findings and complications of typhoid fever. *American Journal of Tropical Medicine and Hygiene* 1999; 61: 41-6.
17. Lathia TB, Joshi R. Can hematological parameters discriminate malaria from non malarious acute febrile illness in the tropics. *Indian J. Med. Sci.* 2004; 58(6): 239-44.
18. Okafor AI. Hematological alterations due to typhoid fever in Enugu Urban Nigeria. *Mal. J. Microbiol* 2007; 3(2): 19-22.