ALTERED HAEMATOLOGICAL INDICES AMONG PATIENTS WITH TYPHOID PRESENTING TO A TERTIARY CARE HOPSITAL

Shaista Ahmed[1], Firasat Waqar[2], Aisha Javed[3], Afshan Siddiqui[4], Sadia Iqbal[5] & Muhammad Muneeb[6], Aatir H. Rajput[7], Abid Ali[8], Anam Shaikh[9] & Tahir Hanif[10]

Associate Professor – Department of Medicine, Abbasi Shaheed Hospital, Karachi[1], Assistant Professor – Department of Medicine, Abbasi Shaheed Hospital, Karachi[2 & 3], Assistant Prof – Department of Medicine, Dow University Hospital, Karachi[4 & 5], Coordinator – Department of Medical Education, Indus Medical College, T.M.K[6], Liaquat University of Medical & Health Sciences, Jamshoro[7, 8 & 10], Dept. of Pathology – Ziauddin University Hospital, Karachi[9]

Abstract:
Objective: To study the altered hematological indices among patients presenting with typhoid to a tertiary care hospital.
Study Design: Descriptive Study Design
Place & Duration: Study conducted at Abbasi Shaheed Hospital, Karachi from July 2, 2018 to Oct 26, 2018.
Methodology: This hospital based descriptive study, was conducted upon a sample of 377 consecutive patients presenting with typhoid (diagnosis confirmed on the basis of Widal test or Typhidot test), at Abbasi Shaheed Hospital, Karachi. After taking written informed consent, data was collected using a structured interview based proforma comprised of inquiries about the respondent's bio data, socio demographic details, and hematological indices (CBC, peripheral smear, electrolyte levels, reticulocyte count and prothrombin time) obtained from laboratory records. The study was carried out from July 2, 2018 to October 26, 2018. Data obtained was analyzed using SPSS version 21.0 and MS. Excel 2013.*
Results: Among of 377 respondents, an approximate 3/5th of them were females (n = 226) and an approximate 2/5th belonged to the male gender (n = 111) with an estimated mean age (29.4 years) and a mean hospital stay of 8 days for males and 5 days for females. The most commonly altered hematological indices observed were; anemia (48.54%), thrombocytopenia (42.71%), elevated prothrombin time (31.8%), leucocytosis (8.2%) and leucopenia (5%). No mortality was reported and all the patients were discharged healthily after treatment.*
Conclusion: Hematological indices are significantly altered in typhoid fever and knowledge regarding these changes can help not only in the diagnosis but management of the condition as well. The changes however are short lived and show positive responsive upon administration of relevant antimicrobial treatment.*
Keywords: *Typhoid Fever, Enteric Fever, Salmonella Typhi, Hematological Indices & Hematological Changes.*

Corresponding author:
Dr. Shaista Ahmed,
Associate Professor – Department of Medicine, Abbasi Shaheed Hospital,
Karachi - *Corresponding Email: shaistaahmed.dr@gmail.com*
Contact Number: +92-333-3179504

QR code

INTRODUCTION:

Typhoid fever, also known as enteric fever, is a common systemic infection caused by the bacterium "Salmonella Typhi". It is a gram negative rod that gains access to the body via the oral route when contaminated food or water is consumed. [1]

It is a major public health problem in many developed countries with the problem being significantly more severe in the developing world. [2] The disease is recognized as a major cause of morbidity globally, affecting over 12.6 million children and young adults worldwide, and causing an approximate 600000 deaths per year. [3]

The Asian continent reports the highest morbidity with an approximate ninety three percent of the total worldwide episodes occurring in Asia alone. The approximated incidence in Southeast Asia is 1100 cases per 0.1 million population, which is the 3rd highest rate of incidence for any region. [4] Despite the scarcity of evidence based data from Pakistan, numerous hospital-based studies from every corner of the country consistently report a rather high incidence of this disease. [5]

Enteric fever, in its course, may involve various organs and lead to a wide array of presentations ranging from uncomplicated typhoid fever to a complicated typhoid fever affecting multiple organs. Typhoid fever is a diagnostic challenge owing to its protean manifestations. The classic presentation comprises of fever, malaise, diffuse abdominal pain and constipation. If left un-treated, the condition may cause delirium, intestinal hemorrhage, bowel perforation and even death within one month of the onset of illness and survivors may face long-term or even permanent neuro-psychiatric complications. [6]

Hematological derangements are believed to be common in typhoid fever, [7] and since complete blood picture is among the forst few investigations ordered in any condition, it may offer a clue to the eventual diagnosis. Pancytopenia, bicytopenia and unicytopenia are all believed to be manifestations of the condition. [8]

This research hopes to determine the exact alterations in hematological indices that accompany typhoid fever. The information obtained may serve as useful guidelines in arriving at a better diagnosis and treatment of the disease. Additionally, apart from diagnosis, accurate knowledge regarding the alteration in hematological indices may help in monitoring the response to therapy and disease course.

METHODOLOGY:

This hospital based descriptive study, was conducted upon a sample of 377 consecutive patients presenting with typhoid (diagnosis confirmed on the basis of Widal test or Typhidot test), at Abbasi Shaheed Hospital, Karachi. After taking written informed consent, data was collected using a structured interview based proforma comprised of inquiries pertaining to the respondents's bio data, socio demographic details, and hematological indices (CBC, peripheral smear, serum urea and electrolyte levels, reticulocyte count and prothrombin time) obtained from laboratory records. The study was carried out from July 2, 2018 to October 26, 2018. Data obtained was analyzed using SPSS version 21.0 and MS. Excel 2013.

RESULTS:

Among of 377 respondents, an approximate 3/5th of them were females (n = 226) and an approximate 2/5th belonged to the male gender (n = 111).

Gender

29.40%

70.60%

Male   Female
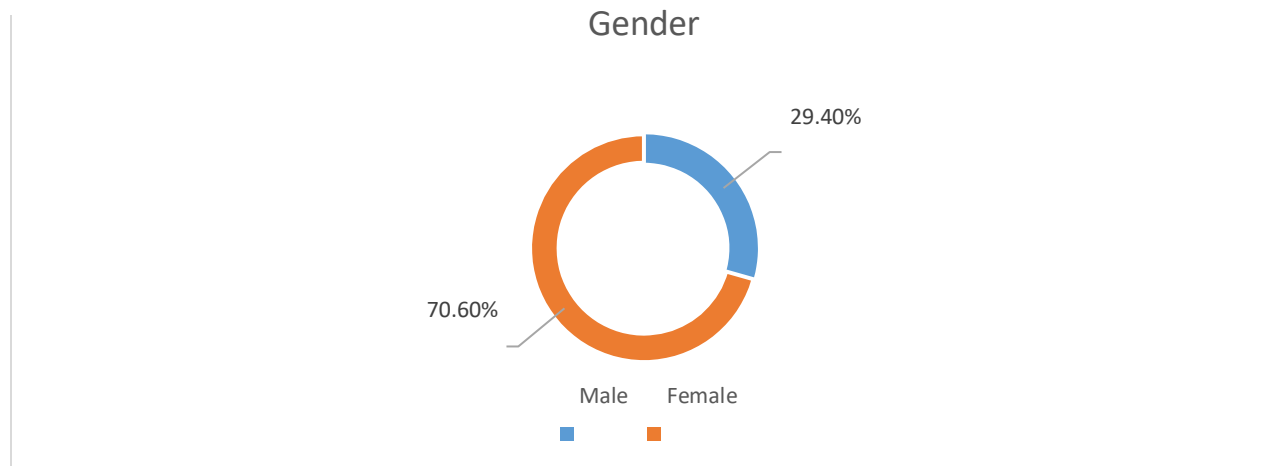
The mean age of the sample was 29.40 years (S.D = $\pm$1.38) and a mean hospital stay of 8 days for males and 5 days for females. The mean value for hematological indices was as follows:

Hematological Indices	Mean Value	S.D.	Probability	Remarks
WBC	34021	1129.4	$p < 0.05$	Significant
PCV	33.29	7.41	$p < 0.05$	Significant
Hb g/dl	11.4	3.1	$p < 0.05$	Significant
Reticulocytes	0.541	0.19	$p > 0.05$	Not Significant
Neutrophils	40.74	12.09	$p > 0.05$	Not Significant
Lymphocytes	54.32	18.97	$p > 0.05$	Not Significant
Monocytes	3.07	2.61	$p > 0.05$	Not Significant
Eosinophils	1.47	2.19	$p > 0.05$	Not Significant
Basophils	0.06	0.07	$p > 0.05$	Not Significant

The most commonly altered hematological indices observed were; anemia (48.54%), thrombocytopenia (42.71%), elevated prothrombin time (31.8%), leucocytosis (8.2%) and leucopenia (5%).
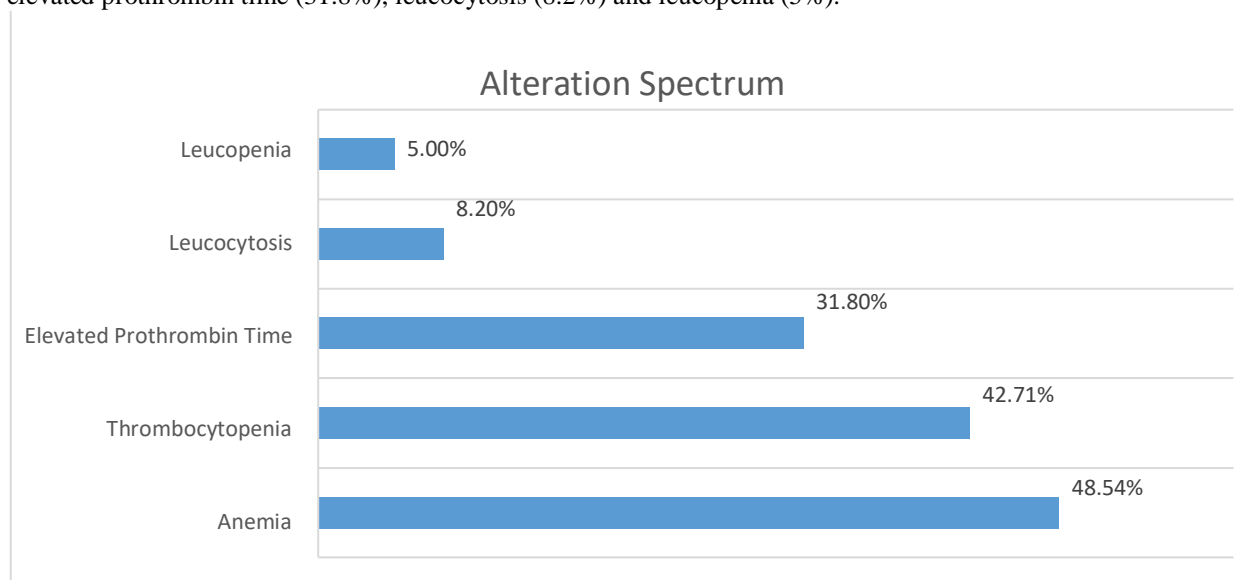
No patient had evidence of disseminated intravascular coagulopathy, eosinophil count was within reference range and urea and electrolyte level was mildly elevated in only 3 patients which soon returned to the reference range with hydration No mortality was reported and all the patients were discharged in good health after treatment.

DISCUSSION:
Various hematological manifestations like hemolytic-uremic syndrome, disseminated intravascular coagulation, and hemolytic anemia are seen among patients suffering from typhoid fever. [9] A range of factors including poor nutrition, endo-toxemia and sub-par response of immune system have been linked to the causation of a number of adverse outcomes. [10] Endotoxins even in instances when they are not released sufficiently in circulatory system, may act locally in the spleen, liver and other reticuloendothelial organs to cause alterations in hematological profile. [11]

In this research, the most commonly reported alteration in hematological indices was anemia (48.54%), a value greater than what is observed by Alam et al (31%) [12] and Ahmed et al (38%), [13] but lesser than however, lesser than what is reported by Rasoolinejad et al (79.4%) [14] and Joseph at al (77.8%). [15]

Thrombocytopenia was reported in 42.71% of the study participants, a statistic much greater than that observed by others (9.1% and 10%). [12, 15] In this research, no evidence was found regarding manifestation disseminated intravascular

coagulopathy, just as observed by a previous study. [14] On the contrary, evidence is available in previous evidence based literature regarding Eosinophilia in typhoid, [15] but eosinophil count was well within the reference range in our study participants.

Contradictory to existing evidence, our research does not report high incidence of derangements in the prothrombin time with the literature reporting values from 57.35 to 67.5% [15] and our research yielding a mere 31.8%. Altered (low) leucocyte count is falsely believed to be a common finding among patients presenting with typhoid fever. In our research, low leucocyte count was seen in a meagre five percent of the study participants. This finding is synonymous with the results reported by Gupta S et al, [16]. In our research, significant renal dysfunction was not observed. 3 patients did have their blood urea and electrolyte levels raised mildly but upon hydration, they returned to the reference range soon.

CONCLUSION:

Hematological indices are significantly altered in typhoid fever and knowledge regarding these changes can help not only in the diagnosis but management of the condition as well. The changes however are short lived and show positive responsive upon administration of relevant antimicrobial treatment.

REFERENCES:

1. Abro AH, Abdou AM, Gangwani JL, Ustadi AM, Younis NJ, Hussaini HS. Hematological and biochemical changes in typhoid fever. Pak J Med Sci. 2009 Apr 1;25(2):166-71.
2. Laskar AR, Suri S, Acharya AS. Scrub typhus: Re-emerging public health problem in India. J Communic Dis. 2015 Sep 30;47(3):22.
3. Geißel B, Penka M, Neubauer M, Wagener J. Typhoid fever, caused by Salmonella enterica serovar Typhi (S. Typhi), remains an unresolved public health problem in India. Int J Med Microbiol. 2017;307(1):28-36.
4. Bhutta ZA, Gaffey MF, Crump JA, Steele D, Breiman RF, Mintz ED, Black RE, Luby SP, Levine MM. Typhoid Fever: Way Forward. Am J Trop Med Hyg. 2018 Sep;99(3 Suppl):89.
5. Rasul F, Sughra K, Mushtaq A, Zeeshan N, Mehmood S, Rashid U. Surveillance report on typhoid fever epidemiology and risk factor assessment in district Gujrat, Punjab, Pakistan. Biomed Res. 2017 Sep 1;28(16):6921-6.
6. Ifeanyi OE. Changes in some haematological parameters in typhoid patients attending University Health Services Department of Michael Okpara University of Agriculture, Nigeria. Int J Curr Microbio Appl Sci. 2014;3(1):670-4.
7. Abd-Alrazaq FS, Ali SJ. A study of the Biochemical and Haematological parameters in Patients of Typhoid Fever. Diyala J Pure Sci. 2017;13(2-part 2):1-9.
8. Uplaonkar SV, Kauser SH, Tengli MB. Haematological profile in typhoid fever. Indian J Pathol Oncol. 2017;4(2):263-5.
9. Akbayram S, Parlak M, Dogan M, Karasin G, Akbayram HT, Karaman K. Clinical and Haematological Manifestations of Typhoid Fever in Children in Eastern Turkey. West Indian Med J. 2016 Jan 1;65(1).
10. Oriá RB, Murray-Kolb LE, Scharf RJ, Pendergast LL, Lang DR, Kolling GL, Guerrant RL. Early-life enteric infections: relation between chronic systemic inflammation and poor cognition in children. Nutr Rev. 2016 Jun 1;74(6):374-86.
11. Li YT, Yu CB, Yan D, Huang JR, Li LJ. Effects of Salmonella infection on hepatic damage following acute liver injury in rats. Hepatobiliary Pancreat Dis Int. 2016 Aug 15;15(4):399-405.
12. Malik AS. Complication of bacteriologically confirmed Typhoid fever in children. J Trop Ped 2002;48:102-8.
13. Ahmet Y, Idris Y, Selahattin K. Clinical and laboratory presentation of typhoid fever. Int Pediatr. 2001;4:227-31.
14. Rasoolinejad M, Esmailpoor NB, Mogbel BA. Salmonella Hepatitis (analysis of hepatic involvement in 107 patients with typhoid fever). Acta Medica Iranica 2003;4.161-3.
15. Joseph J, Tarun KD, Jayanthi S. Correlation of clinical and hematologic profile with bone marrow responses in typhoid fever. Am J Trop Med Hyg 1997;57(3):313-16.
16. Gupta S, Pannu HS, Jain NP, Sandhu JS, Kumar A. Profile and outcome of acute renal failure due to tropical infections–A prospective study. INMJMS. 2016 Apr 1;7(2):62-5.