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CLINICAL AND HAEMATOLOGICAL MANIFESTATIONS OF TYPHOID FEVER IN CHILDREN

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Abstract

Typhoid fever can involve different organs, leading to a multiple range of presentations: from uncomplicated to a deadly and serious complication of typhoid fever. The hematological changes are common in typhoid fever and include anaemia, leucopaenia, thrombocytopaenia and bleeding disorders. This review was undertaken in order to determine the clinical and haematological presentation of typhoid fever in children. **Methods**: In this study, records of children and adolescents with typhoid fever aged under the age of 16 years, admitted to the Hospital between 2018 and 2020, which were analyzed retrospectively. **Results**: During the study period, 583 patients were recorded in 2018, 663 in 2019 and 233 in 2020; of these, the numbers of males were significantly higher than females in the previous three years. **Conclusions**: Typhoid fever is predominant disease with a predominance rate among male patients. Decreased mean platelet volume and abdominal pain might be helpful as early diagnostic indicators for this type of infection.

Introduction

Typhoid fever is an acute infection of the blood and intestinal system caused by the bacterium Salmonella typhi. Typhoid fever constitutes a major public health problem in many developing countries of the world and it has also been increasingly reported from the developed countries. Typhoid fever is a common and widely distributed food-borne disease that is a global major public health problem. It affects around 21 million people each year, which results in 200 000 to 600 000 deaths annually (1). Almost 80% of cases and death occur in Asia. Following ingestion, there is an incubation period of about 10 – 14 days. It is a severe multi-systemic illness characterized by the classic prolonged fever, sustained bacteremia without endothelial or endocardia involvement. The hallmark

of typhoid fever is the invasion of and multiplication within the mononuclear phagocytic cells in the liver, spleen, lymph nodes and payers patches of ileum. Complications of these lesions may end up with hemorrhage or even intestinal perforation in long standing untreated infection.

In the course of enteric fever various organs can being involved leading to a wide range of presentation from uncomplicated typhoid fever to a complicated one involving multiple organs dysfunction. The hematological and biochemical changes due to multi-organ involvement in typhoid fever are not uncommon (2).

The hematological changes which are commonly associated with typhoid fever infection may include anemia, leucopenia, eosinophilia, thrombocytopenia, elevated ESR and sub clinical disseminated intravascular coagulations. Also, elevated prothrombin time (PT), Activated Partial Thromboplastin time (APPT) have also been reported in many children (3).

The Gram-negative bacterium that causes typhoid fever is Salmonella enterica subsp. Based on MLST subtyping scheme, the two main sequence types of the S. Typhi are ST1 and ST2, which are currently widespread throw the world. The global phylogeographical analysis showed dominance of a haplotype 58 (H58) which probably originated in India during the late 1980s and is now spreading through the world carrying multidrug resistance (5). A more detailed genotyping scheme was reported in 2016 and is now being used widely Typhoid fever is most common in parts of the world that have poor sanitation and limited access to clean water systems. Worldwide, children are considered to be most at risk of developing typhoid fever. Humans are the only known carriers of the bacteria (6). *S. enterica* subsp, enterica serovar Typhi is spread through the fecal-oral route from individuals who are currently infected and from asymptomatic carriers of the bacteria. An asymptomatic human carrier is an individual who is still excreting

typhoid bacteria in their stool a year after the acute stage of the actual infection (7). This may be because their immune system is still developing, but children with typhoid fever tend to have milder symptoms than adults. Typhoid fever is uncommon in the well developed countries, with an estimated 500 cases occurring each year (8).

Furthermore, the disease's global prevalence is estimated to be more than 20 million cases a year, with over 200 000 deaths. And Children and young adults who are not immune bear a large portion of this risk (2-4). The rise in antibiotic resistant bacteria among Salmonella Typhi species in recent years has complicated treatment strategies, threatening to overwhelm the diagnostic and screening resources of many developing-country health systems (5-6). Incidence and prevalence are an integral part of the management decision-making process for allocating limited funds for infectious disease control and prevention. Prospective monitoring using blood culture for patients presenting with an unidentifiable febrile syndrome will provide a reasonable estimation of the typhoid disease risk. **Aim of the study:** Carrier state is common and S.bacilli is found in blood, feces and urine. As there is massive multiplication of these bacteria in blood stream, this paper aims to study the frequency and severity of hematological changes in patients of typhoid fever.

Material and methods

From 2018 to 2020, a retrospective incidence analysis of patients admitted with typhoid fever who presented for evaluation to the emergency department or inpatient floors of the adult and pediatric teaching hospitals including Albatool Teaching Hospital was performed. Patients who had a fever of more than 38 °C for more than two days and were clinically suspected by the investigating physician were qualified.

Results:-

Month	201	2019	202
January	47	17	16
Februar	20	25	39
March	37	30	19
April	68	75	33
May	80	81	22
June	63	87	55
July	86	127	0
August	77	56	0
Septem	46	71	9
Octobe	28	45	15
Novem	15	27	12
Decem	16	22	13

Table-1: Number of patients during 3 years period in Albatool Teaching Hospital.

Gender	2018	2019	2020
Male	300	450	133
female	283	213	100
Total	583	663	233

Table-2: Total number of patients according their sex.

During the study period, 583 patients were recorded in 2018, 663 in 2019 and 233 in 2020; of these, the numbers of males were significantly higher than females in the previous three years. Patient incidence rate during 12 months of the year were presented in Table 1. Previous episodes of typhoid fever were reported more commonly in 2019 compare with the last year prevalence which accounted for only 233 patients per year. Among the three years period, the female's number of patients who admitted to the hospital with enteric fever were considerably lower than males.

Discussion

Typhoid fever is one of the most common febrile diseases in the developing countries. The global widespread of antibiotic treatment has changed presentation of typhoid, and the classical mode of symptoms with a slow and “stepladder” rise in fever and toxicity is rarely seen (10) . Typhoid fever has multisystem involvement but the commonest system to be involved is the gastrointestinal system. Measuring the prevalence of typhoid fever is important for a variety of reasons. First, the disease is vaccine-preventable and disproportionately impacts young people, which make up a sizable proportion of both the general population and the labor force. Second, disease control for typhoid fever will aid in the establishment and integration of surveillance programs for other diseases. Finally, typhoid fever prevention measures, such as changes in water systems, can have an effect on other enteric diseases. The current study's estimated incidence of typhoid, 1479 over three years period, respectively, is a low estimate of illness, representing only cases serious enough to present to the hospital. Despite this condition, the calculated incidence of typhoid fever falls within the medium incidence range. The data may not be typical of typhoid fever incidence in other areas of Diyala Governorate; a higher incidence should be expected in metropolitan areas where sanitation and water facilities lag behind that of Diyala's city center.

Other similar studies were reported in the Mosul city among women who attended private clinic of gynecology and obstetrics from 2017 to 2018. In every 4350 cases seen in a private gynecology and obstetrics clinic for some reason during the data collection period, 345 had symptoms of enteric fever, and only 231 matched the case selection requirements and were qualified to be included in the study; others were excluded. A total of 691 cases and controls were included in the study (19-22).

Season	No.	%
Summer	147	63.6
Autumn	43	18.6
Winter	16	6.9
Spring	25	10.8
Total	231	100

Table -3: Seasonal variation of enteric fever patients' presentations

Season	No.	%
Summer	147	63.6
Autumn	43	18.6
Winter	16	6.9
Spring	25	10.8
Total	231	100

Table -3: Seasonal variation of enteric fever patients' present.

Variable	**Cases**	
	No.	**%**
Age < 20 year	**35**	**15.15**
Age 20-50 year	**156**	**67.53**
Age ≥50 year	**40**	**17.31**
Left bank of the city	**115**	**49.78**
Right bank of the city	**89**	**38.52**
Rural	**27**	**11.68**
Education level		
Illiterate	**23**	**9.95**
Primary	**25**	**10.82**
Secondary	**102**	**44.15**
University and Higher education	**81**	**35.06**
Total	**231**	**100%**

Table -4: Socio demographic characteristics of study participants

The majority of the participants (67.5 percent) were between the ages of 20 and 50, with roughly half of them hailing from Mosul's left bank. Furthermore, 75% of them were considered qualified, with 35% having a higher education (23-28).

Symptom*	No.	%
Fever	231	100
Low grade	94	40.6
High grade	137	59.3
Lower abdominal pain	212	91.7
Upper abdominal pain (stomach pain)	74	32
Sudden change in bowel habit	36	15.5
Nausea and Vomiting	183	79.2
Loss of appetite	198	85.7
Joint pain (generalized)	212	91.7
Lower back pain	208	90
Knee and ankle joint	76	32.9
Elbow and shoulder and neck pain	15	6.4
Hip joint	4	1.7
Malaise and lethargy	203	87.8
Headache	78	33.7

Table -5: Common presenting symptoms among study cases

Lower backache and lower abdominal pain were the most commonly reported symptoms, accounting for 91 percent and 90 percent, respectively. (29-33) In 90% of cases, generalized joint pain was present, while fever was present in 100% of cases. Malaise and lethargy were symptoms reported by 87.8 percent of the participants.

Conclusion

Enteric fever is predominant infective illness in children at school age with a male predominance. Most of the cases were admitted in autumn. Decreased MPV

and abdominal pain might be helpful early diagnostic markers. Hematological parameters can be employed to establish the diagnosis of typhoid fever and can provide a reliable and earlier prediction of the disease; therefore early and timely management can be initiated to prevent further complications (16).

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