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ASSOCIATION BETWEEN TYPHOID FEVER AND LEUCOPENIA IN KHARTOUM STATE- SUDAN

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ABSTRACT

Leucopenia is thought to be characteristic findings in patients with typhoid fever. This study was carried out to detect association between Typhoid fever and Leucopenia among typhoid fever patients in Khartoum state, Sudan and to determine the relationship between them. This is descriptive case - control study conducted from March to October 2015. A total of 70 febrile patients' who attended different hospitals. (33 males and 37 females) were enrolled. Serum specimens were tested by Widal test (tube method) for typhoid (50% positive as case and 50% negative as control)and blood specimens in EDTA container were analyzed by Sysmex Automated Machine for total white blood cells count. Generated data were analyzed using SPSS software. Out of the70 typhoid patients tested, 35(50%) were positive case and 35 (50%) were negative group as control. from positive typhoid patients case group8 (22.9%) had leucopenia, while 27 (77.1%) had normal total white blood cells count, ,while negative patients group7 (20%) had leucopenia, 28 (80%)had normal total white blood cells count. The statistical analysis showed insignificant association between typhoid fever and leucopenia. This study indicated statistical insignificant association between typhoid fever and leucopenia among febrile patients in Khartoum –Sudan.

Keywords: Association, Enteric fever, Leucopenia, Widal test, Total white blood cell count, Khartoum, Sudan.

INTRODUCTION

Typhoid fever, also known simply as typhoid, is a bacterial infection due to S typhi at causes symptoms [1]. S. typhi is a human pathogen that spreads by ingestion of contaminated food or water mostlybyfeco-oral route [2]. The disease has received various names, such as gastric fever, enteric fever, abdominal typhus, infantile remittant fever, slow fever, nervous fever and pythogenic fever. The name typhoid means "resembling typhus" and comes from the neuropsychiatric symptoms common to typhoid and typhus [3]. Despite this similarity of their names, typhoid fever and typhus are distinct diseases and are caused by different species of bacteria [4]. Typhoid fever is a serious systemic illness that each year affects over 20 million people, predominantly in developing countries [5].

Typhoid fever is characterized by an acute illness, the first typical manifestations of which are fever, headache, abdominal pain, relative Bradycardia, splenomegaly, and leucopenia [6].

Leukopenia (also known as leukocytopenia) is a decrease in the number of White blood cells (leukocytes) found in the blood, which places individuals at increased risk of infection [7]. WBC count is a test to measure the number of white blood cells (WBCs) in the blood. WBCs help fight infections [8].The normal white cell count is usually between 4 and 11 × 10^9/L. In the US this is usually expressed as 4,000–11,000 white blood cells per microliter of blood [9]. They make up approximately 1%of the total blood volume in a healthy adult [10]. However, a value lower than 4000 per cubic millimeter is considered as low white blood cell count. Mallouh, Sadi *et al* reported that Leucopenia is thought to be characteristic findings in patients with typhoid. Hematological tests are easily done and interpreted, leucopenia is considered a key feature of enteric fever, but studies have shown it to be present in only 20-25 percent of cases [11]. This study aimed to detect association

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between Typhoid fever and Leucopenia among Sudanese patients.

MATERIAL AND METHODS

This was descriptive case- control study which had been conducted in Khartoum state hospitals during period from March to October 2015, 35 patients (positive for typhoid fever) as case and 35 patients (negative for typhoid fever) as control were enrolled, Data was collected by using direct interviewing questionnaire; ethical clearance was obtained from research ethical committee of Faculty of Graduate studies AlNeelain University and verbal consent also was obtained from each patient.

EXPERIMENTAL WORK

Specimen collection

Blood samples were collected from patients, under direct medical supervision by vein puncture using 5 ml syringe into plain tube to obtain serum by centrifugation at5000 rpm for 10 min. serum was kept in -20°C till serological study was performed. Investigated for typhoid fever by Widal test (tube method using the Widal agglutination kit (Egyptian company for Biotechnology, S.A.E-Germany) and venous blood in EDTA tube collected for total white blood cells count by sysmex automated machine (Sysmex Corporation, KX 21N-Japan).

White blood cell count

A WBC count is a blood test to measure the number of white blood cells (WBCs) in the blood.
Absolute leucopenia was considered as blood white cell count by using Sysmex Automated machine (Sysmex Corporation, Kobe, Japan).

Interpretation of assay result

White blood cell (WBC) less than 4000 cellper cubic millimeter considered as leucopenia

Widal test

All reagents and samples were allowed to reach room temperature shaken and mixed well as in manufacture leaflet was prepared.

Two sets of 5 test tubes was taken and labeled themfrom1to5for O and H antibody detection , 1.9ml of isotonic saline was pipetted into first tube of all sets , in remaining tubes (2 to 5)1 ml of isotonic saline was added. To first tube of all sets0.1 ml of serum sample was added and mixed well, then transferred 1mlof diluted sample from first tube to second tube and mixed well ,then transferred 1ml of the diluted serum sample from second tube to third tube and mixed well continued this serial dilution till tube five in each set. Discarded 1.0 ml of the diluted serum from tube five of each set, the dilution of serum sample achieved from first tube to fifths tube respectively in each set that as follows 1:20, 1:40, 1:80, 1:160,1:320. To all the tubes (first to fifths) of each set, one drop of the respective widal test antigen suspension (O and H) from the reagent vials was added and mixed well, then covered the tubes and incubated at 37^{o}c overnight(approximately 18 hours).Dislodged the sediment button gently and observed agglutination.

Interpretation of the result

The titer of the patient serum used spectrum salmonella antigen suspensions was the highest dilution of the serum sample that given visible agglutination(≥1:160) positive for typhoid fever and less than that considered negative for typhoid fever.

Data analysis

Data was analyzed by SPSS (Statistical Package of Social Science) software program version 16.

RESULT

A total of 70 febrile patients who attended Khartoum hospitals during the period from March to October 2015,consented to the study were included, their age ranged from 9 to 75 years, 33(47.1%) were males and37(52.9%) were females, tested for typhoid fever (35 positive and 35 negative as control) all of the case and control were tested for total white blood cells count, from positive cases 22.9%(8 of 35) had leucopenia , while among negative control 20% (7 of 35) had leucopenia(Table 1). Statistical analysis showed that there was insignificant association (P.value = 0.771) between typhoid fever and leucopenia.

Table 1. Association between Typhoid fever and leucopenia among test (Typhoid patients) and control groups

Study groups	Typhoid fever No(%)		TotalNo (%)
	Leucopenia	No leucopenia	
Case group	8(22.9%)	27(77.1%)	35(50%)
Control group	7(20.0%)	28(80.0%)	35(50%)
Total	15(21.4%)	55(78.6%)	70(100%)

P.value = 0.771**Not significant at the 0.05 level.

DISCUSSION

Enteric fever caused by salmonella has high incidence of mortality and morbidity in developing countries. Diagnosisof enteric fever is derived from clinical suspicion and substantiated by laboratory tests. With prompt and appropriate antibiotic therapy, enteric fever is typicallya short-term febrile illness with few complications and a 0.2% risk of mortality [12].

The WBC count is normal in most cases and leukocytosis makes the diagnosis less probable. Leukopenia perceived to be an important feature of typhoid fever and has been reported in only 20-25% cases [13].

Leucopenia, in enteric can be attributed to the myeloid maturation arrest, decrease in the number of erythroblasts and megakaryocytes and increased phagocytic activity of histiocytes in the bone marrow [11].

The present study result revealed 77.1 % was positive for typhoid and normal total white blood cells count and 22.9 % was positive for typhoid but with leucopenia among case group. However among control group it was 80.0 % were normal total white blood cells and 20.0% hadleucopenia. When compared with other studies in Sudan, there was no similar published data.

The present study give result less than that published the previous study in South Africa(1992) obtained by Abdool *et al* in that study leucopenia was found in only 24.6% from 191 adult patients with typhoid, and Leucopenia with neutropenia and a relative lymphocytosis were believed to be common findings in patients with typhoid fever [13].

However, the obtained was slightly higher than the result obtained by Aliasgar *et al* (2012) in Abu Dhabi, United Arab Emirates, Leucopenia is found to be a common hematological finding in typhoid fever. In our study, leucopenia was observed only in 19 % (10 cases out of 51). However, it is comparable to prior observations [14, 15].

The discrepancies of this result may be due to small sample size and differences in the used techniques, for this large scale screening is recommended.

CONCLUSION

This study indicated statistical insignificant association between typhoid fever and leucopenia among febrile patients in Khartoum state–Sudan.

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CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

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