ISSN:0000-0000

Abhath JOURNAL of Basic and Applied Sciences

A semi-annual peer reviewed scientific journal published by the College of Education Hodeidah University

Volume 1, Number 1, June 2022

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ABHATH

Journal of Basic and Applied Sciences

A Semi-Annual Peer - Reviewed Scientific Journal

Issued by the Faculty of Education in Hodeidah – Hodeidah University

Website:
https://ajobas.com

First Volume – First Issue (June 2022)

ABHATH

Journal of Basic and Applied Sciences

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Deposit No. at the 'House of Books' in Sana'a: (159/1443-2022)

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Contents of the Issue

Introduction of the Issue

We are pleased and delighted to present the researchers with this issue of the 'Abhath' Journal of Basic and Applied Sciences, which is the first issue of the first volume, the issuance of which emanates as an affirmation of moving forward towards issuing specialized quality journals.

The Faculty of Education at Hodeidah University aims, by issuing this journal, to publish specialized researches in basic and applied sciences, from inside and outside Yemen, in the English language.

On this occasion, the journal invites male and female researchers to submit their researches for publication in the next issues of the journal.

In conclusion, the editorial board of the journal extends its thanks and gratitude to Prof. Mohammed Al-Ahdal – Rector of the university – the general supervisor of the journal, for his support and encouragement for the establishment of this journal. Furthermore, thanks are extended to Prof. Mohammed Bulghaith – University Vice-Rector for Higher Studies and Scientific Research – vice-supervisor of the journal, for his cooperation in facilitating the procedures for the issuance of this issue. Nevertheless, thanks are for all researchers whose scientific articles were published in this issue, and for the editorial board of the journal, which worked tirelessly to produce this issue in this honorable way.

Journal Chief Editor

Prof. Yusuf Al-Ojaily

Abhath Journal of Basic and Applied Sciences
http://ajobas.com
Received: 2/5/2022. **Accepted:** 15/6/2022 **Vol. 1, No. 1, June 2022**

Hematological Changes Among Patients With Dengue Fever

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Abstract.

Background: Dengue fever is a painful febrile illness caused by a mosquito-borne Arbovirus. Epidemic episodes occur especially during rainy season. All ages and both sexes are susceptible to dengue fever. It is widely prevalent in our country. All four serotypes have been reported. Complete Blood count (CBC) is an important part of in the diagnosis patients with dengue fever and the serological tests is necessary to confirmed it.

Aim: To evaluate the hematological parameters in the patients with dengue fever and correlate those changes with serological tests.

Results: This study include 95 patients with dengue fever from Beit al-Faqih district, Hodeidah Governorate, 50(52.6%) were males and 45(47.4%) were females. Out of 95 patients 44 (46.3%) have both IgM and IgG antibodies against Dengue virus, 30(31.6%) have antibodies IgG only while 21(22.1%) have IgM antibodies only. Leukopenia and Thrombocytopenia was the most common hematological findings in the patients especially those who had positivity for both IgG and IgM antibodies.

Conclusion: Hematology profiles such as white blood cells, platelets play important role in the early diagnosis and predicting prognosis of patients with dengue fever, there was a significant association between thrombocytopenia and serological markers.

Keywords: Leukopenia, thrombocytopenia, lymphocytosis, antibody, antigen.

Introduction

Dengue fever is Vector born viral infections endanger billions of people. About 50 million cases of dengue infection every year all-over the whole world has been estimated by World Health Organization (Marwa., 2017). It is endemic in certain cities of Yemen, such as Taiz, Aden, Al-Mukalla, Al-Hodeidah Governorate and others Tehama District. The large scale of dengue outbreak in Al-Hodeidah governorate is due to the high vector circulation, poor infrastructure, and excesses of raining period more than other cities in Yemen (Al-Garadi.,2015). The viruses are transmitted by day-biting mosquitoes (*Aedes aegypti)* which found in urban areas, preferring to feed on humans. Serotypes DEN-1, DEN-2, DEN-3, DEN-4, cause dengue (DEN) and dengue hemorrhagic fever (DHF). (Gitika et al., 2018).

Dengue fever has nonspecific symptoms and signs, so laboratory confirmation of dengue infection is mandatory. Severe complications may arise in those who have had previous dengue infection. These include hypotensive shock. marked thrombocytopenia lead to spontaneous bleeding, including epistaxis and gastrointestinal hemorrhage (Hoffbrand et al., 2005).

The mechanism for thrombocytopenia is due to depression of bone marrow in acute stage of dengue virus infection also reduced platelet production because of direct damage to the megakaryocytic precursors and platelets in peripheral blood by pre-existing antibodies. Antiplatelet antibodies are produced by NS1 antigen which cross reacts with integrins and adhesins leading to platelet aggregation. (Anita et al., 2017 & Bruna et al., 2020).

Diagnosis of the disease is by measuring IgM and IgG antibodies preferably in paired sera. Although both antibodies may date back to an earlier infection, the ratio of IgM to IgG, or rising titers in paired sera, will help decide whether infection is recent. Since the death in these patients is due to hematological complications, their study would have a substantial impact on reducing the mortality and morbidity associated with dengue (Mike et al., 2000).

In primary infection: IgM antibodies appear about 5 days after the onset of symptoms, continue to rise for about 21 days, and gradually decrease within 1–2 months of onset. They may be present for up to 6 months. IgG antibodies can be detected about 14 days after the onset of symptoms and persist at a lower level for life (Monica., 2006).

Material and methods

This is a descriptive retrospective study. All needed data were collected from the medical Laboratory records of 95 patients from Beit Al-Faqih district, Hodeidah Governorate, with positive serology for dengue infection were studied in detail to evaluate the hematological changes.

Only those patients with positive serology result for dengue were included in this study, any patient seronegative for Dengue Fever was excluded from the study even had thrombocytopenia or leucopenia. The exclusion criteria also included children proved to have malaria, enteric fever.

Hematological investigation data including complete blood counts using fully automated hematology analyzer Sysmex XP. Analyzer provided red blood cells (RBC) count, hemoglobin (Hb), hematocrit (Hct), platelet count, white blood cells (WBC) count, neutrophil, monocyte, lymphocyte and eosinophil counts, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and mean corpuscular haemoglobin concentration (MCHC) moreover, serological investigation data were taken in such patients.

Leukopenia was considered if white blood cell (WBC) count was less than 4×10^9 / L and thrombocytopenia was less than 140×10^9 / L.

Statistical analysis

The data was analyzed using SPSS statistical software version 20, laboratory data were presented as descriptive statistics including frequency, percentage, mean and range. The Chi-square test was used to determine the significance of difference between categorical variables P-values < 0.05 were taken as significant.

Objectives

The objectives of this study were:

1. To assess hematological changes in Dengue fever patients
2. To correlate these changes with different stages of serology outcome.

Results

This study included 95 patients diagnosed with dengue were tested for CBC and serology tests. Among these 95 patients, 50(52.6%) were males while 45(47.4%) were females, their ages ranged from 1 year to 65 years with a mean age of 15.34 years (Tables 1&2).

Table 1. Gender distribution of patients with dengue fever (n 95).

Gender	Number of cases (n)	Percent (%)
Male	50	52.6
Female	45	47.4
Total	95	100.0

Table 2. Age distribution of patients with dengue fever (n 95).
(the mean of Age 15.43)

Age in years	Number of patients (n)	Percent (%)
0-10	49	51.6
11-20	19	20.0
21-30	14	14.7
31-40	7	7.4
>40	6	6.3
Total	95	100.0

Hematological investigations including complete blood counts were done by fully automated hematology analyzer, Hemoglobin level ranged from 6 g/dL to 16 g/dL with the mean ±SD of 11.5 ±1.67g/dL (Table 3).

Table 3**. Hemoglobin levels in patients with dengue fever (n 95).**

Hb (g/dL)	Number of patients (n)	Percent (%)
<9	6	6.3
9-11	32	33.7
11-16	57	60.0
Total	95	100.0

Red blood cell (RBC) count ranged from 2.56 $x10^6$ / L to 6.40 $x10^6$ / L with the mean ± SD of 4.7 ±0.71 $x10^6$ / L .Sixty three (66.3%) patients had had decreased RBC count while thirty two (33.7%) patients had RBC count within the normal range, i.e., (4.5–6.4) $x10^6$/L. Table 4, RBC indices revealed that, Mean corpuscular volume (MCV) ranged from 61.5 to 93.8 FL. with mean ± SD 75 ±5.5 and Mean corpuscular haemoglobin concentration (MCHC) ranged from 29 to 36.3 g/dL mean ± SD 33.3 ±1.4 g/dL.

Table 4. **Red blood cell (RBC) count in patients with dengue fever (n 95).**

RBC ($x10^6$/L)	**Number of patients (n)**	**Percent (%)**
<4.5	63	66.3
4.5 -6.4	32	33.7
Total	95	100.0

Total leukocytes (WBC) count ranged from 1.80 $x10^9$ / L to 10.0$x10^9$ / L with the mean ± SD of 5.8 ±2.5 $x10^9$ / L, twenty-nine patents (30.5%) had decreased in WBC count (Leukopenia) and sixty-six patients had WBC count within normal range (4 -10) $x10^9$/L.

Thirty-two (33.7) patients had neutropenia (Neutrophils <45%) and 41of them had lymphocytosis (lymphocytes >40%).Tables 5 &6.

Table 5. Leukocytes (WBC) count in patients with dengue fever (n 95).

WBC ($x10^9$/L)	**Number of patients (n)**	**Percent (%)**
<4	29	30.5

4-10	66	69.5
Total	95	100.0

Table 6. differential leucocyte count in patients with dengue fever (n 95).

WBC		**(n)**	**(%)**	**WBC**		**(n)**	**(%)**
Neutrophils	Normal (45-75) %	46	48.4	**Lymphocytes**	Normal (20-40) %	37	38.9
	Low <45%	32	33.7		Low <20%	17	17.9
	High >75%	17	17.9		High >40%	41	43.2
Total		**95**	**100 %**	**Total**		**95**	**100%**
Monocytes	Normal (2-8) %	75	79	**Eosinophils**	Normal (1-6) %	80	84.2
	Low <2%	20	21		Low <1%	15	15.8
	High >8%	0	0		High >6%	0	0
Total		**95**	**100**	**Total**		**95**	**100%**

Platelet count ranged from 24 $x10^9$/L to 339 $x10^9$/L with the mean ±, SD of 144.8±0.71 $x10^9$/L. Seventy patients (74%) showed thrombocytopenia, 54(56.8%) of them had mild thrombocytopenia., platelet count from (100 to 150) $x10^9$/L, 9(9.5%) patents had moderate thrombocytopenia and 7(7.4%) had severe thrombocytopenia showed platelet count less than 50 $x10^9$/L. Table 7

Table 7. Platelets count in patients with dengue fever (n 95).

Platelets (x10^9 / L)	**Number of patients (n)**	**Percent (%)**
<50	7	7.4
50-100	9	9.5
100-150	54	56.8
>150	25	26.3
Total	95	100.0

All 95 patients confirmed for dengue fever by serological tests. Forty-four patients (46.3%) were positive for both IgM and IgG, thirty patients (31.6%) were positive for IgG only, and twenty-one patents (22.1%) were positive for IgM only. Table 8.

Table 8. Serological distribution in the patients with dengue fever (n 95).

Serology test	**Number of patients (n)**	**Percent (%)**
Antibodies (IgG)	30	31.6
Antibodies (IgM)	21	22.1
Antibodies (IgG + IgM)	44	46.3
Total	95	100.0

Leukopenia and Thrombocytopenia was the most common hematological findings in the patients who had positivity for both IgG and IgM antibodies, 42(95.5%) patients of them have significant thrombocytopenia while 20(45.5%) patients have leukopenia. Table 9.

Table 9. Comparison of leucocyte count, platelets count and serotypes in the patients of dengue (P <0.04).

Serology test	**Number of patients**	**Leukopenia N (%)**	**Thrombocytopenia N (%)**
Antibodies	30	8(26.7)	13(43.3)

(IgG)			
Antibodies (IgM)	21	14(66.7)	17(81)
Antibodies (IgG + IgM)	44	20(45.5)	42(95.5)

Discussion

This study included 95 patients 50(52.6%) males and 45 (47.4%) females. In the present study, Dengue Fever was more common in males (52.6%), than females (47. 4%).This is in accordance with a study in Saudi Arabia and others studies found the number of males patients infected with dengue fever more than females (Marwa., 2017) &. (Prabhavati et al., 2019). The reason for male preponderance is due to their clothing habits in Tehama District.

The results of this study showed that mean ± SD of Hb level was 11.5±1.7 g/dl, and lowest Hb level was 6.0 g/dl. This is similar to the results of Sanjay et al., (2018), who showed that patients with dengue patients had low Hb values compared with healthy peoples.

This study revealed white blood cell WBC count was significantly lower in dengue patients, Total leukocytes (WBC) count ranged from 1.80 $x10^9$ / L to 10.0$x10^9$ / L with the mean ± SD of 5.8 ±2.5 $x10^9$ / L, twenty-nine patents (30.5%) had decreased in WBC count (Leukopenia). This is agreed with previous studies indicated that patients with dengue had significantly lower (WBC) counts (Kotepui et al 2020).

Thrombocytopenia was the most prominent haematological changed during dengue infection, in this study, low platelet count was observed. Platelet count ranged from 24 $x10^9$/L to 339 $x10^9$/L with the mean ±, SD of 144.8±0.71 $x10^9$/L. Seventy patients (74%) showed thrombocytopenia, 54(56.8%) of them had mild thrombocytopenia, 9(9.5%) patents had moderate thrombocytopenia and 7(7.4%) had severe thrombocytopenia showed platelet count less than 50 $x10^9$/L. The previous studies indicated

that, the most significant laboratory abnormality seen in dengue patients was thrombocytopenia (Tahir et al 2012 and Kotepui et al 2020).

Serologically, more than one marker was detected in this study. (46.3%) were positive for both IgM and IgG. These findings were in agreement with results of Patil and Kanabur (2019) who reported that the 40.5% of dengue patients have IgM and 10.6% have IgG.

There is correlation between serological marker and hematology profile in the present study, 42(95.5%) patients of the patients who had positivity for both IgG and IgM antibodies have thrombocytopenia while 20(45.5%) patients have leukopenia, this is consistent with the results of Patil and Kanabur (2019).

Conclusion.

Dengue is a disease affecting both male and female of all age groups with male preponderance. Alteration of hematological parameters and serological markers are very helpful for early diagnosis and monitoring patients with dengue fever. Thrombocytopenia and leukopenia were the most prominent haematological changed during dengue infection**.** Thrombocytopenia was associated more with recent infection, there was a significant association between thrombocytopenia and serological marker IgM so it plays an important role in the early diagnosis and predicting prognosis**.**

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