

## ASSESSMENT OF SOME CLINICAL AND LABORATORY PROFILES AMONG DENGUE FEVER PATIENTS AT HAJJAH GOVERNMENT, YEMEN

### Abstract

**Background:** Dengue fever is a neglected disease which causes a serious complication in tropical and subtropical regions.

**Objective:** This study is designed to evaluate some clinical profiles and laboratory parameters among the confirmed cases with dengue fever at Gheran Al-Moharqe district in Hajjah government, Yemen.

**Methods:** A total of 46 specimens were collected from confirmed cases with dengue fever that hospitalized in Yaseer and Thabet hospitals between September to December 2019. The collected specimens were examined for some hematological tests such as hemoglobin (Hb), white blood cells (WBCs), hematocrit (HCT), and a platelet count (PLT). Also, dengue confirmation was performed by a non-structural protein (NS1) stripe.

**Results:** The obtained result revealed that the males had the highest rate (73.91%) of DF than females (26.09%). Also, the higher frequency was (69.56%) among the group aged 16-30 years old. The high fever and headache in (100%, each), nausea in (95.65%), vomiting in (78.26%), and skin rash in (19.56%). It was found that the most hematological abnormality was WBCs, followed by PLT, Hb, and HCT at 89.1%, 84.78%, 63.04%, and 23.91%, respectively, of cases.

**Conclusion:** This is the first report documented the occurrence of dengue fever in Hajjah government high which indicates the widespread spread of this disease among the governorates that require more attention for preventing and controlling.

**Keywords:** Clinical characterization, Dengue fever, Hajjah government, Yemen.

### INTRODUCTION

Dengue fever (DF) is the commonest human infection caused by the Dengue virus that is transmitted by the bite of an infected female of the *Aedes aegypti* mosquito. Four serotypes of the dengue virus that are DEN-1, DEN-2, DEN-3, and DEN-4 were identified and one of them able to cause the dengue infection. Dengue fever is threatening to human life and causes a serious infection that leads to morbidity and mortality in most tropical and subtropical areas of the world<sup>1</sup>.

Globally, it is estimated that there are between 50 to 100 million cases of dengue fever annually, including more than half of the million recorded cases of dengue hemorrhagic fever (DHF). Currently, dengue is endemic in over 110 countries in the world, and about 40% of the world's population living in Dengue endemic countries<sup>2,3,4</sup>.

Dengue disease may have a high attack rate in all age groups of people, regardless of whether they are residents of or travelers to areas of endemicity. It is self-limiting disease and there no specific treatment or vaccine is presently available<sup>1,5,6</sup>.

The clinical manifestation of dengue disease ranging from asymptomatic to an undifferentiated fever (called Dengue Fever) to the more severe forms such as severe dengue (SD) or DHF. The DF is characterized by headache, fever, myalgia, arthralgia, rash, nausea, and vomiting<sup>1,6</sup>.

However, the manifestations of severe DF is characterized by altered vascular endothelial permeability, decreased platelet levels, plasma leakage, bleeding, dangerously low blood pressure, and shock, which may lead to death<sup>7,8</sup>.

Yemen is one of the poorest countries in the world and the absence of a mosquito control system facilitates the dengue prevalent in the warmest area at a different rate. Also, numerous factors attributed to the increase of suspected cases of DENV among study areas<sup>9,10,11</sup>.

Hajjah government is a neglected area with dengue infection and will be coming to the epidemic region in future. So, this is the first study that aimed to evaluate the common clinical and laboratory parameters among patients with dengue fever at Hajjah government, Yemen.

## **MATERIALS AND METHODS**

### **Study Area**

This work was carried out at the Gheran Al-Moharqe district that belongs to the Hajjah government located in Northwestern of Yemen. The climate in this district is warm throughout the year except for winter with moderate temperature. Also, it is part of the Tehama coastal plain and has an exceedingly hot, humid, and arid climate.

### **Study Design**

This is a cross-sectional study was done at Yaseer and Thabet hospitals during the period from September to December 2019. Patients confirmed (age range, 1 to 70 years) of having DF and showed positive for dengue NS1 stripe test in hospital laboratory examination.

### **Ethical Approval**

The study protocol was permitted by the Ethical Review Committee from the Medical Microbiology Department, Faculty of Applied Science, Hajjah University, and health office in government.

### **Inclusion and Exclusion Criteria**

The inclusion criteria were all patients showed positive test for DF and were hospitalized in the hospitals willing to be included in the study. Also, exclusion criteria were included all patients who showed negative for the DF test.

### **Data Collection**

A designed questionnaire was subjected for collecting the required data from enrolled patients. The data collected were personal information (age, gender) signs and symptoms (temperature, headache, skin rash, vomiting, nausea), risk factors (one member of their family's infected and mesquite net used). Each participant was informed about the purpose of this work and the questionnaire was filled by a researcher via face-to-face interview.

### **Specimens Collection and Examination**

Blood specimen was separately collected from each patient by venipuncture and directly transmitted to the laboratory for processing and examination. The hemoglobin (Hb), white blood cells (WBCs), hematocrit (HCT), and a platelet (PLT) count were measured according to WHO<sup>1</sup> protocol. Also, the blood serum was examined for dengue confirmation testing by DENV non-structural protein (NS1) stripe<sup>1</sup>.

## RESULT

A total of 46 confirmed patients were enrolled in this study. This finding observed that the high frequency of DF disease by sex was 34 (73.91%) in males when compared to 12 (26.09%) in females with DF (Table 1).

**Table 1:** The frequency rate of DF among patients according to gender

Gender	Number of infected	Rate (%)
Male	34	73.91%
Females	12	26.09
Total	46	100%

In this result concerning age group, it was found that the highest rate of DF was 69.56% recorded among the age group of 16-30 years old, followed by age group of 31-45 years old. Also, the lowest rate of DF was 4.34% reported among group aged 46-70 years (Table 2).

**Table 2:** The frequency rate of DF among age groups

Age (in years)	Number of infected	Rate %
1-15	5	10.88%
16-30	32	69.56%
31-45	7	15.22%
46-70	2	4.34%
Total	46	100%

Table 3 shows that at least one member of participant's families was infected by DF with 41.30%. Also, the frequency of DF was 41(89.13%) recorded among patients who used net mosquito.

**Table 3:** Risk factors among participated patients

Risk Factor	Number of infected	Rate %
One member of their families infected	19	41.30%
Mosquito Net Used	41	89.13%

The clinical symptoms and signs associated with DF among participated patients were listed in Table (4). It was found that all participated patients were completely (100%) suffered from high fever and headache symptoms. Also, only 9(19.56%) of cases were presented the skin rash. The vomiting and nausea symptoms were 36(78.26%) and 44(95.65%), respectively, observed among cases.

**Table 4:** The clinical symptoms and signs associated with cases

Clinical Presentation	Number of infected	Rate %
High Fever	46	100%
Headache	46	100%
Skin Rash	9	19.56%
Vomiting	36	78.26%
Nausea	44	95.65%

Table 5 shows the laboratory result of some hematological examinations. It was observed that there was an increase in Hb level among 63.04% when compared to 36.96% with a normal result. Also, about 89.1% of cases had an abnormality of WBC level. In addition, 84.78% and 23.91% of cases with DF had raised the PLT and HCT levels.

**Table 5:** Hematological test result

Type of Test	Normal result (%)	Abnormal result (%)
Hb	17(36.96)	29(63.04)
WBC	5(10.9)	41(89.1)
PLT	7(15.22)	39(84.78)
HCT	35(76.09)	11(23.91)

## DISCUSSION

The high prevalence of epidemic diseases in Yemen resulting from continue war since 2015 until now that lead to the destruction of the basic services of the healthcare system, sanitation services, shortage of clean water, create the suitable environment for mosquitoes propagation, and absence of mosquitoes control particularly in conflict area facilitating the rise widespread of infectious diseases<sup>11,12</sup>.

The present result revealed that the highest prevalence of DF was (73.1%) more among when compared with females (26.09%). In a similar study by Abdullah *et al.*<sup>11</sup> who found that 67.3% of cases were males and 32.7% were females in Taiz, Yemen. Also, several reports that were carried out in some regions in Yemen documented that males were more affected by fever infection than females<sup>13,14,15</sup>.

The high rate of DF present among males might be referring to the work conditions of that performed by males at all time of day outside of the home which make them more exposed to the bite of *A. aegypti*.

In the current work, it was found that the age group of 16-30 years old was the most infected by DF than other age groups. This finding is in agreement with the result by Abdullah *et al.*<sup>11</sup> who found that the age group of 21-30 years the most susceptible for DF than other age groups. Similar findings were also supported with previous reports that observed that the age group of 20-45 years were more exposed to DF<sup>14,16,17,18</sup>. This finding implies that the persons in these age groups spent their time outdoors during the day which increased their likelihood to infect with the Dengue virus by vector bite.

The present work observed that 41.30% of the member of participant's families were infected with DF previously. It can be implied that the prevalence rate of DF among the population in the study area is more than obtained results.

In this study, the commonest clinical manifestations were high fever (100%), headache (100%), nausea (95.65%), vomiting (78.26%), and skin rash (19.56%). The study by Khan *et al.*<sup>19</sup> found that the most clinical symptoms were fever (98.8%), vomiting (57.8%), skin rash (27.3%), and headache (13%). Also, Chaloe Wong *et al.*<sup>20</sup> showed that the fever was (100%) the most symptoms followed by headache (47.4%), nausea (33.8%), and skin rash (6.5%). The high rate of clinical symptoms in this work is indicating that the disease may be in the advanced stage which may be developed to severe stage.

The most frequent hematological abnormality was WBC at 89.1% followed by PLT at 84.78%, Hb at 63.04%, and HCT at 23.91% of cases. Oliveira *et al.*<sup>21</sup> observed that the abnormality of PLT was 66.5% recorded among cases. Also, a similar observation by Chaloe Wong *et al.*<sup>20</sup> who found that abnormal results of platelet count, white blood cell, hemoglobin, and hematocrit were recorded among the dengue fever patients.

The limitation in this study is representing on the lack of much data due to that may be useful for comparison and the diagnosis of dengue infection. Also, the study area is very close to war zones, which made it difficult to continue the study for a long time. The serological examination method for the Dengue virus depended on the NS1 stripe due to the absence of modern laboratory equipment such as ELISA. This limitation might influence the results obtained in this study. Consequently, further investigations should be conducted to find out the relationship between the dengue infection and associated factors.

## **CONCLUSION**

The high rate of dengue fever established in this study throughout four months can be concluded that the Gheran Al-Moharqe is becoming one of the most endemic areas in Yemen. Several factors contribute to increasing the frequency of dengue fever among study area. Therefore, it is important to get the attention of the public health administration for preventing and controlling the mosquito prevalent.

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## **AUTHOR'S CONTRIBUTION**

The manuscript was carried out, written, and approved in collaboration with all authors.

## **CONFLICT OF INTEREST**

No conflict of interest associated with this work.

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