

ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

DEPARTMENT OF PUBLIC HEALTH

ASSESSMENT OF THE PREVALENCE AND PATTERNS OF SUSPECTED DENGUE FEVER EPIDEMIC AT DILCHORA HOSPITAL IN DIRE DAWA

BY: MURTESSA AHMEDTEYIB (Intern)

ADVISORS: TAKELE MENNA (PhD)

BISRAT HUSSEIN (MD)

A STUDENT RESEARCH REPORT TO BE SUBMITED TO THE DEPARMENT OF PUBLIC HEALTH, SPHMMC, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF MEDICINE

ADDIS ABABA
JULY, 2018



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Acronym & Abbreviation

Ae: Aedeus

AR: Attack Rate

CBC: Complete Blood Count

DENV: Dengue Virus

DF: Dengue Fever

DHF: Dengue Hemorrhagic Fever

DSS: Dengue Shock Syndrome

ELISA: Enzyme-linked immunosorbent assay

ESR: Erythrocyte Sedimentation Rate

FMOH: Federal Ministry of Health

Hgb: Hemoglobin

Hct: Hematocrit

L: Lymphocytes

N: Neutrophils

OPD: Out Patient Department

PCR: Polymerase Chain Reaction

SRS: Simple Random Sampling

SPSS: Statistical Package for Social Science

WBC: White Blood Cells

WHO: World Health Organization

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Abstract

Background; Dengue fever (DF) is a febrile illness caused by any one of four serotypes of the dengue flavivirus. Humans acquire dengue virus infections primarily through the bites of Aedes aegypti mosquitoes. It is widely distributed in Africa and has adapted to breeding in artificial containers such as used tires. In September 2013, there were unidentified febrile cases reported in Dire Dawa which later identified as DF. Since then, there were repeated reports every year including 2017 and measures have been taken to halt the spread of the infection. So, I wanted to assess the current prevalence of the disease in that specific area of the country.

Objective; the objective of this study was to assess the prevalence and patterns of Dengue fever at Dilchora Hospital in Dire Dawa.

Methods; The target population for this study was all patients visited OPD at Dilchora Hospital, in Dire Dawa. Hospital based cross sectional descriptive study and a SRS procedure was conducted to select a fair representative sample from the patients. Since the number of total population is more than 10,000 the sample size was determined based on a single population proportion formula. So, one hundred and eighty-five patients will be selected for the study. To collect the data, a self-administered data collection form was used. After the data is collected, it was entered into a computer and analyzed using SPSS version 21.0 statistical software. Multivariable logistic regression with 95% CI at $P \leq 0.05$ was used to determine factors associated with the prevalence of the disease in that area

Result; From a total of 132,419 patient presented to OPD of 3,160 was suspected of dengue fever which makes the prevalence of dengue fever to be 2.4%. The majority of respondent were in the age range of 21-30, 61(37%) followed by 11-20, 40(24%). All of the study participant present with fever and none of them present with bloody vomitus, rapid breathing, restlessness and swollen gland

Conclusion and recommendation; Dengue fever was relatively comparable with other study and was relatively common in autumn season. The most common presentation was fever.

1. Introduction

1.1 **Background**

As the most imperative mosquito-borne viral disease distressing humans worldwide, DF continues to be a major public health problem in tropical and subtropical areas (1). The World Health Organization rates dengue as the most dominant mosquito-borne viral disease in the world as its incident rates have increased 30-fold in the past 50 years (2). Also estimates 50 to 100 million cases resulting in 25,000 deaths annually (3). Arboviral infections are usually sensitive to changes in rainfall and temperature (4). Population growth and increased individuals' movement, urbanization, and the limited financial and human resources are attributed to the emergence and reemergence of the disease (5-7). Presence of the virus, sufficient numbers of susceptible population, and mosquito vectors are required for dengue transmission (4,5). Re-infestation of vectors to new geographical areas, warm and humid climate, increased population density, water storage pattern in houses, storage of trash like tires, and introduction of new serotype of the virus serve as risk factors for dengue virus infections (8). Travelers also have the potential to acquire and spread dengue virus infection (9).

The four dengue viruses originated in monkeys and independently jumped to humans in Africa or Southeast Asia between 100 and 800 years ago (10). The first recognized dengue epidemics occurred almost simultaneously in Asia, Africa, and North America in the 1780s, shortly after the identification and naming of the disease in 1779. A pandemic began in Southeast Asia in the 1950s, and by 1975 DHF had become a leading cause of death among children in the region. The first case of DHF was reported in Manila, Philippines around 1953 through 1954 (11). Epidemic dengue has become more common since the 1980s. By the late 1990s, dengue was the most important mosquito-borne disease affecting humans after malaria, with around 40 million cases of dengue fever and several hundred thousand cases of dengue hemorrhagic fever each year. Significant outbreaks of dengue fever tend to occur every five or six months. The cyclical rise and fall in numbers of dengue cases is thought to be the result of seasonal cycles interacting with a short-lived cross-immunity for all four strains in people who have had dengue. When the cross-immunity wears off, the population is more susceptible to transmission whenever the next seasonal peak occurs (12).

There is significant evidence, originally suggested by S.B. Halstead in the 1970s, that dengue hemorrhagic fever is more likely to occur in people who have secondary infections by another one of dengue fever's four serotypes. One model to explain this process is known as antibody-dependent enhancement (ADE), which allows for increased uptake and virion replication during a secondary infection with a different strain. Through an immunological phenomenon, known as original antigenic sin, the immune system is not able to adequately respond to the stronger infection, and the secondary infection becomes far more serious (13).

Dengue remained a relatively minor, geographically restricted disease until the middle of the 20th century. The disruption of the second world war, in particular the coincidental transport of *Aedes* mosquitoes around the world in cargo, are thought to have played a crucial role in the dissemination of the viruses. It was not until 1981 that large numbers of DHF cases began to appear in the Caribbean and Latin America, where highly effective *Aedes* control programs had been in place until the early 1970s (10).

In Africa, the epidemiology and public health effect of dengue is not clear (1). Dengue was reported in Africa in the late 19th and early 20th centuries. Epidemics were reported in Zanzibar (1823, 1870), Burkina Faso (1925), Egypt (1887, 1927), South Africa (1926–1927), and Senegal (1927–1928) (11,14,15). The epidemic in South Africa was confirmed by retrospective neutralizing antibody testing in the mid-1950s, but the other reported epidemics were not laboratory confirmed and therefore may not have been dengue. During the 50 years from 1960 through 2010, twenty laboratory-confirmed dengue outbreaks were reported in 15 countries in Africa; most were from eastern Africa. Nearly 300,000 cases were reported in 5 large epidemics in the Seychelles (1977–1979), Réunion Island (1977–1978), Djibouti (1992–1993), Comoros (1992–1993), and Cape Verde (2009) (15-18). DENV was first isolated in Africa in Nigeria in the 1960s (19). Subsequently, all four DENV serotypes have been isolated in Africa (11). DENV-2 has been reported to cause most epidemics, followed by DENV-1 (17,18).

Available data strongly suggest that DENV transmission is endemic to 34 countries in all regions of Africa. Of these countries, 22 have reported local disease transmission, 20 have reported laboratory-confirmed cases, and 2 (Egypt and Zanzibar) have reported only clinical cases that were not laboratory confirmed. In the remaining 12 countries, dengue was diagnosed only for travelers returning to countries to which dengue was not endemic but never reported as occurring locally in these 12 countries (1).

In regions to which malaria is endemic, >70% of febrile illnesses are treated as presumptive malaria, often without proper medical examination and a laboratory diagnosis (20,21). In a setting where diagnostic testing is conducted, such as the Geo-Sentinel Surveillance Network, malaria was found to be the predominant cause of systemic febrile illness among travelers returning from sub-Saharan Africa (622/1,000 patients) compared with dengue (7/1,000) (22). This finding is not unexpected because malaria is more endemic to Africa than other febrile illnesses. However, over diagnosis of malaria in areas of low transmission is well documented, and overestimation by clinical diagnosis is ≈61% (20,21). Many patients in Africa with fever are designated as having fever of unknown origin or malaria and remain without a diagnosis even if they fail to respond to antimalarial drugs. Under these prevailing practices, there is a real potential of misdiagnosing dengue as malaria (1). Among travelers returning from low- and middle-income countries, dengue is the second most diagnosed cause of fever after malaria (23).

Dengue should be suspected when a high fever (40°C/104°F) is accompanied by 2 of the following symptoms; severe headache, pain behind the eyes, muscle and joint pains, nausea, vomiting, swollen glands or rash. Symptoms usually last for 2–7 days. Severe dengue warning signs include: severe abdominal pain, persistent vomiting, rapid breathing, bleeding gums, fatigue, restlessness and blood in vomit (23).

1.2 Statement of the problem

Mosquito-borne diseases are the most significant public health risks globally (24). Dengue fever infection is one of the most important arboviral diseases in humans. It is endemic in Africa, the Americas, eastern Mediterranean, SE Asia, and the Western Pacific, threatening more than 2.5 billion people (25). It is estimated that 50–100 million dengue infections occur each year (26).

Dengue is likely under-recognized and underreported in Africa because of low awareness by health care providers, other prevalent febrile illnesses, and lack of diagnostic testing and systematic surveillance. Population-based studies of febrile illness are needed to determine the epidemiology and true incidence of dengue in Africa (1). Though outbreaks of DF/DHF are poorly documented in Africa (1,27), infections were also reported from eastern Africa (1,14). Dengue morbidity can be reduced by implementing improved outbreak prediction and detection through coordinated epidemiological and entomological surveillance (26).

In Ethiopia, considerable but incompletely documented numbers of arboviral diseases are endemic. However, infections remain underreported due to lack of laboratory facilities and inaccessibility of some of the endemic areas (28). The disease was reported between 1985 and 1987 in refugees around Hargeysa in Somalia (29).

At the end of 2013, in Dire Dawa, 9,258 people were suspected of DF and, of these, 40 were confirmed as DF cases (30). The dengue fever that occurred in Dire Dawa varied from mild to severe with symptoms of sudden onset of fever which lasted for 2-3 days (extended to 4-5 days in some cases), headache (typically located behind the eyes), mild to severe muscle and joint pains (general body pain in some cases), feeling cold, loss of appetite, feeling weak especially after recovery and arthritis-like symptoms/pain. Nose bleeding and vomiting were also reported in few cases. Some of the patients were also hospitalized. Stored water in the container for long period, extended rainfall during the rainy season, and ambient relative humidity and temperature may favor the breeding of Ae. aegypti and other aedine mosquitoes. Since the town is center of industry and tourism, it is preferred by people of neighboring countries (Djibouti and Somalia) for temporary stay during the hot season. Many people also migrate to the town in search of job linked with railway construction, and thus individuals infected with arboviruses such as dengue may disseminate the disease in the town aided by the bite of Aedes mosquitoes (29).

1.3 Rationale /Justification of the study

Dire Dawa is one of the two federal cities in Ethiopia and is called queen city of the desert. Different ethnic groups live in this city and there is high human mobility from neighboring countries like Djibouti and Somalia and from different parts of the world. Patients with fever, headache, abdominal discomfort, and diarrhea clinical symptoms were observed and confused with malaria and typhoid (29).

In September 2013, Dire Dawa town of Ethiopia reported unidentified febrile cases which later identified as a case of Dengue Fever. Since then, there were yearly reports of the case from that area in spite of subsequent measures been taken to halt the spread of the disease. Currently, Dilchora hospital is the only referral hospital in Dire Dawa. By conducting this research in that particular hospital, we will be able to assess the prevalence and associated factors of the epidemic in the city in 2017 retrospectively. I hope, it can also be taken as a reference to plot further measures to be taken in the future to enhance the health status of the people.

2. Literature review

2.1 Global situations

The incidence of dengue has grown dramatically around the world in recent decades. The actual numbers of dengue cases are underreported and many cases are misclassified. One recent estimate indicates 390 million dengue infections per year, of which 96 million manifest clinically (31). Another study estimates that 3.9 billion people, in 128 countries, are at risk of infection with dengue viruses (32). The number of cases reported from member states in 3 WHO regions increased from 2.2 million in 2010 to 3.2 million in 2015. Based on official data submitted by member States, cases across the Americas, South-East Asia and Western Pacific exceeded 1.2 million in 2008 and over 3.2 million in 2015. In 2015, 2.35 million cases of dengue were reported in the Americas alone, of which 10,200 cases were diagnosed as severe dengue causing 1,181 deaths (23).

There was a serious outbreak in Rio de Janeiro in February 2002 affecting around one million people and killing sixteen. On March 20, 2008, the secretary of health of the state of Rio de Janeiro, announced that 23,555 cases of dengue, including 30 deaths, had been recorded in the state in less than three months (33). By April 3, 2008, the number of cases reported rose to 55,000 (34). In Singapore, there are 4,000–5,000 reported cases of dengue fever or dengue hemorrhagic fever every year. In the year 2004, there were seven deaths from dengue shock syndrome (35).

In 2009, in Argentina, a dengue outbreak was declared in five provinces with over 9,673 cases reported as of April 11. On Easter island, an outbreak caused by serotype DENV-1 occurred in 2002, 2006-2009 and 2011 with decreasing magnitude over time. The male: female ratio in reported cases was approximately 1:1 and the average age at infection was 31.38 ± 18.37 in both sexes (36). As of 3 March 2009, there were 503 confirmed cases of DF, in a residential population of 152,137 in cairns, Australia. In Bolivia, in early 2009, 18 people died and 31,000 were infected (12).

A 2010 outbreak in Puerto Rico resulted in 5,382 confirmed infections and 20 deaths. There was an outbreak in Pakistan with more than 5,000 confirmed infections and a mortality rate of 31 (12). The 2010 and 2009 dengue outbreaks in Key West Florida (37) are similar to the 2005 Texas (25 cases) and 2001 Hawaii (122 cases) outbreaks, which were locally sustained on American soil and not a result of travelers returning from endemic areas (38).

In 2011, in Philippines, there were 18,885 cases and 115 deaths which was 5% higher than the preceding year (39). Until April 16, 2011, Brazil has recorded 56,882 cases with 39 deaths, Paraguay with 27,000 cases and 31 deaths (12). 52,008 cases of DF were recorded in Thailand from Jan to Oct 16, 2012, with 50 deaths (40). In 2012, an outbreak of dengue on the Madeira islands of Portugal resulted in over 2,000 cases (23).

In 2013, in Brazil, in only 7 weeks, 205,000 cases of dengue were reported with double deaths over 2012, a record (41). In Peru, nearly 400 cases have been reported until March 2013; two of them were fatal (42). As of June, 2013, 150,000 people in Thailand affected, with 50 deaths (worst in 20 years), and 44 deaths in Laos and 11,000 cases, 14,000 cases in Singapore but only 6 deaths, 22 deaths in Malaysia and 10,500 cases (43) while 42,500 cases in Philippines with about 200 deaths (44). Dengue deaths have tripled in Malaysia until Feb 2014 over 2013, after tripling 2013 over 2012 (45). On September 2, 2014, the Japanese health ministry confirmed that 34 people had been infected (46). In 2015, Delhi, India, recorded its worst outbreak since 2006 with over 15,000 cases. In Hawaii, USA, there were 181 cases reported in 2015 (23).

The year 2016 was characterized by large dengue outbreaks worldwide. The Region of the Americas region reported more than 2.38 million cases in 2016, where Brazil alone contributed slightly less than 1.5 million cases, approximately 3 times higher than in 2014. 1,032 dengue deaths were also reported in the region. The Western Pacific Region reported more than 375,000 suspected cases of dengue in 2016, of which the Philippines reported 176,411 and Malaysia 100,028 cases, representing a similar burden to the previous year for both countries. The Solomon Islands declared an outbreak with more than 7,000 suspected (23).

In 2017, the Region of Americas have reported 50,172 cases of dengue fever, a reduction as compared with corresponding periods in previous years (23). A Dengue fever outbreak in the Indian state of Kerala in May and June 2017 had caused 6,808 confirmed infections and 13 deaths by June 16 (47). In Sri Lanka, during the first six month of the year 2017, 63,987 suspected dengue cases have been reported to the Epidemiology Unit from all over the island (12) with at least 301 patients dead (48).

A prospective observational study conducted in Bangladesh revealed that 18 % of the dengue fever patients had anorexia, 61 % had nausea, 66 % had vomiting, 28 % had abdominal pain and 80 % had headache (49).

Clinical symptoms in patients with DF admitted in the hospital during the period 1995-1999 in Thailand was assessed and abdominal pain was the most common complaint (30.1 %). Myalgia was seen in 12.9 % of the patients. Maculopapular rash during the febrile phase was found in 11.6 % of the patients. Typical convalescence rash was found in 19.4 % of the patients. Hepatomegaly was seen in 80.4 % of the patients. The mean age for DF cases was observed as 7.9 years. The age group 5-9 years was the most affected group by dengue fever. No gender difference was observed in DF patients (50).

A retrospective study among German travelers showed that all the patients had fever and prostration (100 %), Other symptoms were headache (86 %), arthralgia (79 %), rash (66 %) and myalgia (48 %) (51).

Among patients with serological confirmed dengue infection during an epidemic in 2001 in Thailand, 26 % had cough,15 % had headache, 8 % had myalgia, 40 % had hepatomegaly, 21 % had 21 petechiae, 57 % had nausea and 59 % had vomiting. All patients were presented with fever (100 %). Forty percent of patients had hepatomegaly. The total number of patients included in their study was 347 of which 287 were children and 60 were adults. The male: female ratio was 1.08:1 and the median age was 10 (4 months to 66 years) (52).

During a dengue -3 epidemics in 2001 to 2002 at Havana city Cuba, fever (100 %), headache (92.1 %), myalgia (76.3 %), arthralgia (73.7 %) and retro orbital pain (57 %) were the most frequent general symptoms. Vomiting and abdominal pain were observed in 59.2 % and 48.6 % of cases respectively. Hepatomegaly was seen in 1.8 % of the patients. All the 22 patients studied were adults (16 -64 years). The maximum incidence was seen in ages 25 to 44 years. Thirty-one patients were males and sixteen were females (53).

A prospective study carried out on characteristics of dengue fever in Jeddah, Saudi Arabia from May 2004 till April 2005 found that the commonest clinical presentation was fever (100 %), headache (48.72 %), myalgia (66.7 %) and vomiting (25.64 %). Rash, hemorrhagic manifestations and 24 positive tourniquet test were relatively uncommon. Hepato splenomegaly (12.56 %) was also uncommon (54).

In Srilanka, a study made on dengue revealed that platelet count (< 150 x 109/L) in all the patients. Fifty-one patients had 100x109/L of platelet count and 13 had < 50x109/L platelet count, Hematocrit >40 % was seen in 53 patients and <40 % was observed in 6 patients (55).

Study made in Kerala reported that 6 % of patients had >16 gm % hemoglobin. Hematocrit (<45 %) was observed in 72 %, total WBC count (< 4000 mm3) was found in 40 % of dengue patients. Platelet <100000 mm3 was found in 90 % of the patients out of which 48 % of patients had <50000 mm3 and 8.4 % had <10000 mm3 (56). A study performed in Karachi, Pakistan revealed that 86 % of the dengue patients had thrombocytopenia, 57 % of them had anaemia and 43 % had leucopenia (57).

A prospective clinical study of dengue fever in Malaysia reported that anemia was commonly seen in males (66 %) and females (34 %). Leucopenia was found in 31 % of the patients and thrombocytopenia (Platelet count less than 150.000/mm3) was found in 92 % of the total cases. The clinical presentation in the early febrile phase of illness is that of an undifferentiated fever. The prevalence of individual symptoms varied from one report to another. The most common symptoms were fever (100.0%), followed by headache (27% - 100%), myalgia and athralgia (39%-99%), and nausea and vomiting (38%- 54%). Less common symptoms were rash (18-24%), petechiae and bleeding tendencies (7.0%-62%), and neurological deficits (1.2%) (58).

2.2. African situations

Burkina Faso reported a localized outbreak of dengue with 1,061 probable cases (23). A study in Nigeria determined the prevalence of flavivirus infections among 1,816 children and adults from urban and rural areas in samples obtained mainly during the early 1970s. Virus-specific hemagglutination inhibition testing showed that the prevalence of immunity was 38% for DENV-1 infection, 45% for DENV-2 infection (59). Collenberg et al. reported that the prevalence of antibodies against DENV determined by igG indirect ELISA among a sample of pregnant women and blood donors (n = 683) was 26.3% in rural settings and 36.5% in urban settings in Burkina Faso (60). However, in Cameroon, the prevalence of antibodies against DENV determined by neutralization testing among 256 adults was only 12.5% (61).

In South Africa, based on a review of the patient files and active follow up case investigations for 2012 and 2013, the most frequently observed symptom associated with dengue infection was fever (80%, 24/30). Other symptoms include, headache (10/30), myalgia (11/30), nausea/ vomiting/ gastric pain (9/30), conjunctivitis (4/30), lymphadenopathy (4/30) and sore throat (2/30). Development of rash, which is typical for dengue, was recorded in 30% (11/30) of patients and manifested in maculopapular, hemorrhagic or petechial forms in the abdominal area, on the legs, or on other parts of the body. Thrombocytopenia was recorded in 8/30 patients and sub-conjunctival hemorrhage was recorded for one patient. Although very few incidents of hemorrhagic fever have been recorded in South Africa, more complicated forms of dengue occurred amongst the patients suffering from prolonged fever, headache, body pains and lymphadenopathy lasting for five to ten days. These symptoms, combined with skin rash, liver and blood pathology, required admission to a hospital. No deaths were reported due to acute disease amongst these cases (3).

2.3. Ethiopian situations

Based on study conducted in Dire Dawa at 2013, A total of 11,409 suspected Dengue Fever cases with one death were identified from September 2013 to December 31/2013. All these cases were negative for malaria by microscopy. Of these, 5,729 (50.2%) were males and 5,680 (49.8%) females. The crude AR was 3.60% (3.61% in males and 3.60% in females). Almost all cases were outpatient consults; only 37 (0.32%) cases were admitted. The trend increased to peak from the second week of October and started to fall from the second week of November (62).

The cases were unevenly distributed across the kebeles of the city administration. Accordingly, kebele 09 was mostly affected (AR: 6.16%, 5.78% in males and 6.55% in females) followed by kebele 01 (AR: 5.03 %, 6.10 % in males and 3.95 % in females). Median age was 21 years and the age range was 3 months to 95 years. The descriptive data analysis showed that the most affected age group is 15-44 years (AR: 5.43 %, 5.38% in males, 5.53% in females) followed by 45 years and above (AR: 3.16%, 2.96% in males, 3.36% in females). The least affected age group consisted of under-five-year-old children (1.1%). The six whole blood samples cultured for bacterial infections showed no growth for Salmonella species, Streptococcus pneumoniae, E. coli, Klebsiella Pneumonia, and brucella species. Of the 88 serum samples tested for arboviruses, 50 (56.8%) were positive either by ELISA and/or PCR for dengue virus infection. All the serum samples tested negative for Rift-valley Fever, Chikungunya, and Crimean-Congo virus. Serotyping of the Dengue virus showed a DENV-2 serotype. Water-storage containers (Jerry cans, buckets and plastic/metallic drums) were the most common mosquito breeding sites encountered. Of the total 563 (42 indoor and 521 outdoor) containers purposely investigated in five Kebeles, 96 (17%) were found to be positive for Aedes aegypti. Among 42 indoor containers examined, 5 (11.9%) containers and among 521 outdoor containers examined, 92 (17.5%) containers were found to be positive for Aedes aegypti breeding (62).

In 2015, a total of 301 houses were surveyed for the presence of artificial breeding containers for Aedes mosquitoes, and, of these, 208 houses were found to contain positive containers. Overall, 750 artificial containers were inspected among which 405 containers were found positive for mosquito larvae. Most of the artificial water storage containers were located outdoors (9;23.06%), were uncovered or partially covered (87.6%), and were totally or partially sun exposed (67.86%). The residents mostly store clean rain water (72.66%) for washing clothes (29).

3. Objectives of study

3.1. **General objectives**

- to assess the prevalence and patterns of Dengue fever at Dilchora Hospital, in Dire Dawa

3.2. **Specific objectives**

- to assess the prevalence of Dengue fever in Dilchora Hospital, Dire Dawa, Ethiopia
- to determine the common presentations of suspected dengue fever patients visited OPD of Dilchora Hospital, Dire Dawa
- to determine the treatment outcome of suspected dengue fever patients visited OPD of Dilchora Hospital, Dire Dawa

4. Methods and Materials

4.1 **Study Area**

This study was conducted in Dire Dawa administrative council. Dire Dawa administrative council is found at a distance of 515 Kilometers from Addis Ababa to the Eastern part of the country and 333 Km from the international port of Djibouti. It is enclosed by the Somali and Oromia regional states. The council has nine operational districts (four rural and five urban districts). It is further classified into 10 urban and 37 rural kebeles (kebele is the smallest administrative unit in Ethiopia). The administrative council is grouped in to arid and semiarid climatic zones. The north eastern part of Dire Dawa is relatively sparsely populated lowland populated by agro-pastoral and pastoral occupants, and the southeastern part of the administration comprises of the escarpment with mixed farming system. Dire Dawa lies between 1000 to 2000 meters above sea level. At a latitude and longitude of 9°36′N 41°52′E respectively. The average monthly temperature is 24.8ºC while the average annual rainfall amounts to 604 mm (3).

4.2 **Study Design**

Hospital based retrospective descriptive study was conducted to carry out this research

4.3 **Source Population**

The source population for this was all patients visited OPD at Dilchora Hospital, Dire Dawa city, in 2017.

4.4 **Study Population**

All patients with suspected dengue fever infection based on WHO case definition for dengue fever and visited OPD at Dilchora Hospital, Dire Dawa city, in 2017.

4.5 **Sample Size Determination**

To calculate the sample size, since the source population size is more than 10,000, a single population proportion formula, [n = (Z α/2)2 p (1-p) / w2], was employed. In previous studies done in Cameroon, the prevalence of antibodies against DENV determined by neutralization testing among 256 adults was 12.5% and this is taken as (P= 0.125). In addition, 95% confidence level with margin of error 5% (d= 0.05) were used. Hence, the sample size was calculated as

$n_o = (Z\alpha/2)^2 \, p \, (1-p) / d^2$

$= (1.96)^2(0.125) \, (0.875)/ \, (0.05)^2 = 168$

Since the total population (N) is not large in comparison to no, the finite population correction formula will be calculated as

$N = n_o / (1+no/N)$

$=168/ \, (1+168/3160) = 160$

Considering 10% non-response rate, the final sample size obtained was 176.

4.6 **Sampling Technique**

Source of data: the hospital's patients' record room.

Type of data: patients' charts with information about their disease including demographic data, clinical presentation, investigation, diagnosis and management

Sampling: Stratified random sampling followed by a simple random sampling procedure was be conducted to select a fair representative sample from the patients visited OPD in 2017. The number of patients to be selected from each month of the year was proportional to the size of the patients seen in that month of the year; which was determined by Probability proportional to size. From a particular month, patients were selected by simple random sampling method (lottery method).

4.7 **Inclusion and Exclusion criteria**

Inclusion criteria:

- ❖ Patients visited Dilchora Hospital OPD in 2017 and who were diagnosed with dengue fever infection based on WHO case definition criteria,
- ❖ Patients who were fully investigated including CBC and blood film

Exclusion criteria: those who don't fulfill the inclusion criteria

4.8 **Data Collection Instruments**

Self-prepared and administered data collection form was used for data collection. It was filled with an information on the charts of the patients.

4.9 **Study Variable**

Dependent

- ✓ Suspected Dengue fever
- ✓ Treatment outcome of Dengue fever [e.g. cured or died]

Independent

- ✓ Socio demographic characteristics of the patients
- ✓ Clinical manifestations during hospital visit

4.10 **Operational Definitions**

Clinical Presentation: signs and symptoms stated on a WHO case definition for DF

Diagnosis: those diagnosed based on the WHO case definition

Treatment: those started on proper supportive management to alleviate signs and symptoms

Cured: those patients who did not visit the hospital for the same compliant

Recurred: those patients who visited the hospital for the same compliant

Patient: any person who visited the hospital to seek medical care

4.11 **Data Management and Analysis**

The filled data collection form was checked for its completeness and consistency by the principal investigator. Code was given to the completed questionnaire. The coded questionnaire was categorized by months of the year. The principal investigator with an experienced data clerk enter the data into a computer and analyze using SPSS version 21.0 statistical software. Data cleanup was performed to check for accuracy, consistencies & values. Central tendency & dispersion was used, analyzed and described in the form of frequency tables & depicted graphically. Chi-square statistical test was used and Internal comparison was done.

5. Ethical clearance

Ethical clearance was obtained from Public Health Department of St. Paul's Hospital Millennium Medical College(SPHMMC). Letter for cooperation was submitted to Dilchora Hospital. Confidentiality of the patients was maintained mainly by not including name of the patient.

6. Dissemination of the result

The findings of this study will be disseminated to different pertinent organizations or concerned governmental and non-governmental organizations working towards preventing the disease. It will also be presented in different seminars, meetings and workshops and may be published in scientific journals.

7. Result

7.1 sociodemographic characteristics of the study participants

The majority of respondent were in the age range of 21-30, 61(37%) followed by 11-20, 40(24%). Regarding sex of the study population, 74(45%) were male and 88 (55%) female. 151(93%) were from Dire-Dawa.

Table 1 sociodemographic characteristics of the study participants (n=162)

Variable		Frequency	Percent
Age	11-20	40	24
	21-30	61	37
	31-40	30	18
	41-50	16	10
	>50	15	9
Sex	Male	74	45
	Female	88	55
Region	Dire dawa	151	93
	Other	11	7
Season of presentation	Autumn	86	53
	Winter	25	15
	Spring	14	9
	Summer	37	21

7.2 Clinical presentation

All of the study participant present with fever. 136(84%) had headache, 105(64%) had muscle and joint pain, 62(38%) had loss of appitite,33(20%) had nausea, 29(17%) had fatigue, 25(15%) had vomiting, 21(13%) had retro-orbital pain, 18(11%) had abdominal pain, and none of them present with bloody vomitus, rapid breathing, restlessness and swollen glands. The mean duration of illness was 3.6 days with ± 3.25.

Table 2 clinical presentation of patients visited OPD of Dilchora Hospital in 2017(n=162)

Variable	Frequency	Percent
Abdominal pain	18	11
Headache	136	84
Bleeding gum	1	0.6
Loss of appetite	62	38
Muscle and joint pain	105	64
Pain behind eye	21	13
Chills and rigor	13	8
Nausea	33	20
Fatigue	29	17
Back pain	23	14
Vomiting	25	15

7.3 Laboratory finding and management

From a total of 162 respondents, 111(68%) had normal wbc count, 152(93%) normal hgb, 150(92%) normal platelet counts and 2(1.2%) were positive for urinalysis. 15(9%) were reactive for widal test and 2(1.2%) of them h/p was seen. Regarding treatment given, 154(95%) were sent home after counseled on rest 15(9%) and 8(5%) were admitted to ward. 19(11%) were resuscitated with fluid. Regard to medication, 145(90%) anti pain, 39(24%) cipro, 7(4%) were given amoxicillin, 2(1.2%) were given antimalarial, 1(0.6%) Augmentin, 4(2.5%) multivitamin.

Table 3 laboratory finding and treatment given for patients visited OPD of Dilchora Hospital in 2017(n=162)

Variable		Frequency	Percent
WBC	Abnormal	51	32
	Normal	111	68
Hgbn	Abnormal	10	7
	Normal	152	93
Platlet	Low	12	8
	Normal	150	92
Blood film	h/p seen	2	1.2
	h/p not seen	160	98.8
Widal test	Reactive	15	9
	Not reactive	147	91
Urinalysis	Positive	2	1.2
	Negative	160	98.8
Disposition	Admitted	8	5
	Sent home	154	95
Counseld on rest		15	9
Counseld on danger sign		2	1.2
Outcome	Symptom free	153	94
	Recurred	9	6

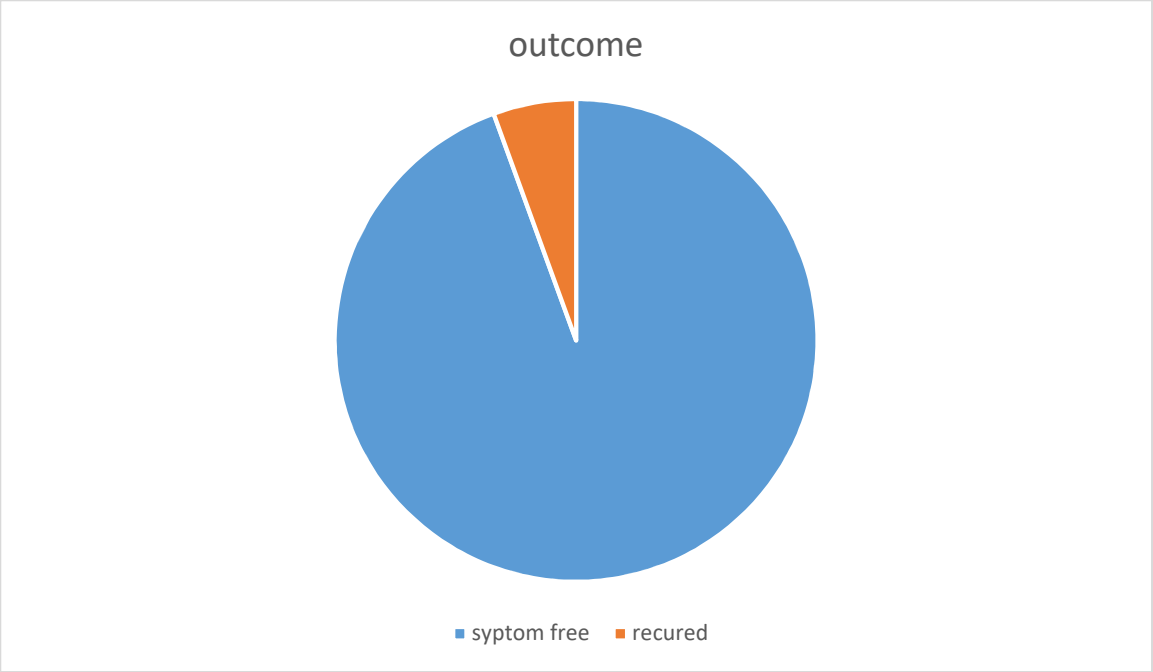


Figure 1 treatment outcome of patient presented to OPD of Dilchora Hospital in 2017(n=162)

Table 4 antibiotics and anti-pain given for patient visited OPD of Dilchora Hospital in 2017(n=162)

Variable		Frequency	Percent
Anti-malaria		2	1.2
Multi vitamin		4	2.5
Cipro		39	24
Augmentin		1	0.6
Anti-pain		145	90
	Diclofenac	6	3.7
	Ibuprofen	1	0.6
	Panadol	1	0.6
	Paracetamol	132	81
	Tramadol	4	2.5
Amoxicillin		7	4.3

8. Discussion

From a total of 132,419 patient presented to OPD of 3,160 was suspected of dengue fever which makes the prevalence of dengue fever to be 2.4%.

Regarding their presentation, All of the study participant present with fever. 136(84%) had headache, 105(64%) had muscle and joint pain, 62(38%) had loss of appetite, 33(20%) had nausea, 25(15%) had vomiting, 21(13%) had retro-orbital pain, 18(11%) had abdominal pain, and none of them presented with bloody vomitus, rapid breathing, restlessness and swollen glands.

A retrospective study among German travelers showed that all the patients had fever and prostration (100 %), Other symptoms were headache (86 %), arthralgia (79 %), rash (66 %) and myalgia (48 %) (51).

A prospective study on characteristics of dengue fever in Jeddah, Saudi Arabia from May 2004 till April 2005. They found that the commonest clinical presentation was fever (100 %), headache (48.72 %), myalgia (66.7 %) and vomiting (25.64 %). Rash, hemorrhagic manifestations and 24 positive tourniquet test were relatively uncommon. Hepato-splenomegaly (12.56 %) was also uncommon (54).

The clinical presentation in the early febrile phase of illness is that of an undifferentiated fever. The prevalence of individual symptoms varied from one report to another. The most common symptoms were fever (100.0%), followed by headache (27% - 100%), myalgia and athralgia (39%- 99%), and nausea and vomiting (38%- 54%). Less common symptoms were rash (18-24%), petechiae and bleeding tendencies (7.0%-62%), and neurological deficits (1.2%) (58).

Regarding laboratory investigation, from a total of 162 respondents, 111(68%) had normal wbc count ,152(93%) normal hgbn,150(92%) normal platlt count and 2(1.2%) were positive for urinalysis. 15(9%) were reactive for widal test and 2(1.2%) of them h/p was seen.

In Srilanka, a study done on dengue revealed that platelet count (< 150 x 109/L) in all the patients. Fifty-one patients had 100x109/L of platelet count and 13 had < 50x109/L platelet count, Hematocrit >40 % was seen in 53 patients and <40 % was observed in 6 patients (54).

A study performed in Karachi, Pakistan revealed that 86 % of the dengue patients had thrombocytopenia, 57 % of them had anemia and 43 % had leucopenia (57).

A prospective clinical study of dengue fever done in Malaysia reported that anemia was commonly seen in males (66 %) and females (34 %). Leucopenia was found in 31 % of the patients and thrombocytopenia (Platelet count less than 150.000/mm3) was found in 92 % of the total cases (58).

9. Strength and limitation

Strength

1. It is the first study which describes the pattern of presentation of dengue fever in that specific area

Limitation

1. time and budget
2. some of the information was not available during data collection
3. there was lack of experience in the field of research and public health
4. this study didn’t asses the risk factor associated with dengue fever epidemic

10. Conclusion

Dengue fever was relatively comparable with other study .and was relatively common in autumn season. The most common presentation was fever. Majority of patient had normal WBC 111(68%),152(93%) normal hgbn,150(92%) normal platlet count and 2(1.2%) were positive for urinalysis.15(9%) were reactive for widal test and 2(1.2%) of them h/p was seen. Most of them were sent home 154(95%) after counseled on rest 15(9%)and 8(5%) were admitted to ward.19(11%) were resuscitated. With regard to medication 7(4%) were given amoxicillin, 2(1.2%) were given antimalarial, 145(90%) anti pain,1(0.6%) augmentin,39(24%) cipro,4(2.5%) multivitamin

11. Recommendation

1. For the hospital;

    There should be proper chart keeping trend

    The patients should be managed accordingly and advised on danger sign

2. For Dire Dawa health bureau;

    They should supplement the hospital and health center with proper diagnostic material

3. For FMOH

    They should implement proper preventive measure to halt the epidemic

12, Reference

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