Demographic Profile Presenting Complain and Clinical Findings of Patients with Dengue Fever Presented in a Tertiary Care Hospital of Bangladesh

Abstract

Background & Objective: Dengue is an important tropical infection caused by an arbovirus having four serotypes (DENV-1, DENV-2, DENV-3, DENV-4) transmitted through the bite of infected female Aedes mosquito. Dengue is a challenging disease with multisystemic, varied, atypical, and sometimes life-threatening presentations. It presents as varied clinical spectrum of dengue fever (DF), dengue hemorrhagic fever (DHF), dengue shock syndrome (DSS) and expanded dengue syndrome (EDS) with atypical presentations, thus posing a diagnostic dilemma. Each year, thousands of dengue infections are reported and there are several outbreaks of dengue in several countries including Bangladesh and this imply the global importance of this infection. The objectives of this study were to determine the sociodemographic variables, presenting complain and clinical findings of patient suffering from dengue fever during an epidemic outbreak.

Methods: This hospital review analyzed the hospital records of dengue fever cases of BIRDEM General Hospital, Dhaka from June 2019 to December2019. Patients with suspected dengue fever attending at the outdoor/emergency or admitted indoor were taken as case. Data were collected from hospital records. Study protocol was approval by the Institutional Review Board and informed consent were taken from the subjects. All the relevant data regarding history and examination findings of the patients, the laboratory reports were collected. Statistical package for social science (SPSS) version 22, a computer-based software was used for all data entry and statistical analysis.

Results: Total 292 dengue patients were enrolled in this study. Mean age of all patient was 35.63±15.22 years (11-85 year) with male predominance (54.8%). Maximum patients were hailed from urban residence (83.9%), non-smoker (73.6%), had active lifestyle (63.4%) and normal body mass index (68.5%). Overall, 65.1% patients had no comorbidity and 89.4% had no concurrent acute illness.Majority of the patients had high grade fever (76%) for 2-5 days (71%). Bodyache (63.7%), headache (42.1%), vomiting (41.1%), loose motion (16.8%) and abdominal pain (14.7%) were the top five chief complaints along with fever. Most of the patients had normal systolic (86.3%) and diastolic (92.5%) blood pressure.

Conclusion: Although the results of this study cannot be generalized to other cities of Bangladesh, our findings will allow public health agencies in Bangladesh to concentrate their efforts to battle dengue and also suggests that monitoring where Aedes are found will help identify populations at risk". Our study will guide doctors of all level to early diagnose dengue patient and will help them to detect the severe cases early. So that early intervention can decrease the morbidity and mortality.

Keywords: Bangladesh, Dengue fever, clinical findings, presenting complain,

Introduction

Dengue is an important tropical infection caused by an arbo- virus. There are four types of viruses (DENV-1, DENV-2, DENV-3, DENV-4) belonging to the *Flaviviridae* family. The viruses are transmitted through the bite of infected *Aedes aegypti* and *Aedes albopictu*s female mosquitoes that feed both indoors and outdoors during the daytime (from dawn to dusk). These mosquitoes breed in areas with standing water, including puddles, water tanks, containers and old tires. Lack of reliable sanitation and regular garbage collection also contribute to the spread of the mosquitoes.

The *Aedes aegypti* mosquito, the principal vector involved in the transmission of the debilitating human viral disease dengue, which sometimes manifests as life-threatening dengue haemorrhagic fever, has an additional climate-related limitation in that it prefers clean water in which to breed. Satisfying this predilection requires either or both exposure to recent rainfall and close proximity to human habitation (Reiter, 1988). Not surprisingly, in examining the epidemiology of dengue, most research on this subject focus on rainfall or humidity. This tendency can be found in relatively early studies, such as by Moore (Moore, 1985) which showed that both the volume of rain and the persistence of rainfall were good predictors, since when the tendency for rainfall to offer the most consistent early warning measure has continued (Arcari, Tapper, &Pfueller, 2007). Relationships can be non-linear, specific to particular geographic locations, and involve long lag times between predictors and outbreaks of disease.

Risk of dengue exists in tropical and subtropical areas of Central America, South America, Africa, Asia, and Oceania. Millions of world populations are infected with arbo viral infection every year. Each year, thousands of dengue infections are reported and there are several outbreaks of dengue in several countries including Bangladesh and this imply the global importance of this infection. Dengue occurs in urban and suburban settings with higher transmission rates happening during the rainy season.

In some cases, dengue infection is asymptomatic – persons do not exhibit symptoms. Those with symptoms get ill between 4 to 7 days after the bite. The infection is characterized by flu-like symptoms which include a sudden high fever coming in separate waves, pain behind the eyes, muscle, joint, and bone pain, severe headache, and a skin rash with red spots.

The infection may be asymptomatic or present itself with a broad clinical spectrum that includes both severe and non-severe clinical manifestations. After the incubation period (4 to 10 days), the illness begins abruptly and is followed by three phases—febrile, critical, and recovery. Symptoms include severe abdominal pain, vomiting, diarrhea, convulsions, bruising, and uncontrolled bleeding. High fever can last from 2 to 7 days. Complications can lead to circulatory system failure and shock, and can be fatal (also known as DSS). Most dengue patients recover without requiring hospital admission while some may progress to severe disease. However, some outbreaks present uncommon clinical presentations might be problematic in diagnoses. The severity of infection varies in different outbreak. The mortality in different

outbreaks are usually different. The medical facilities and skill of local practitioner important determinants of outcome of dengue case management. It is also been influenced by fields such as economy, health system and environmental indices. This highlights the need of the knowledge on clinical management of dengue illness.

The incidence of dengue has grown dramatically around the world in recent decades. A vast majority of cases are asymptomatic or mild and self-managed, and hence the actual numbers of dengue cases are under-reported. Many cases are also misdiagnosed as other febrile illnesses (Waggoner et al. 2016).

One modelling estimate indicates 390 million dengue virus infections per year (95% credible interval 284–528 million), of which 96 million (67–136 million) manifest clinically (Bhatt S. et al.2013). Another study on the prevalence of dengue estimates that 3.9 billion people are at risk of infection with dengue viruses. Despite a risk of infection existing in 129 countries Brady O.J. et al, 2013) 70% of the actual burden is in Asia (Bhatt, S et al.2013). The number of dengue cases reported to WHO increased over 15-fold over the last two decades, from 505,430 cases in 2000 to over 2,400,138 in 2010 and 3,312,040 in 2015. Deaths from 2000 to 2015 increased from 960 to more than 4032. The largest number of dengue cases ever reported globally was in 2019. All regions were affected, and dengue transmission was recorded in Afghanistan for the first time.High number of cases were reported in Bangladesh (101,000), Malaysia (131,000) Philippines (420,000), Vietnam (320,000) in Asia (WHO fact sheet 2020).

Dengue fever has re-emerged as a major public health challenge worldwide, with 2.5 billion people at risk of infection, more than 100 million cases and 25000 deaths being reported annually (Mustafa, 2015). The dengue circumstances in Bangladesh is getting worse this year (2019) as the number of infected people has more than doubled since last month, compared with the same period last year. According to a report of Directorate General of Health Services of Ministry of Health & Family Welfare, Dhaka, Bangladesh, 16223 people were infected with dengue in July and 9006 more till 6th August and 18 of them died. A total of 10,148 people was infected with dengue last year and 26 of them died. Most of the people who have been died due to dengue this year have been suffered from Dengue shock syndrome (DSS) and are infected in second-time. DSS is a dangerous complication from dengue which is often caused by a secondary infection with a different virus serotype (Akram, 2019).

Although having 19 years' knowledge of dengue management, the unfortunately large number of deaths indicates that urgent awareness is required to strengthen the early detection of dengue at all healthcare facilities. Except it, public health management like a vector control program, awareness regarding prevention and regular surveillance are very important.

Materials and method

This hospital review analyzed the hospital records of dengue fever cases of BIRDEM General Hospital, Dhaka from June 2019 to December2019. Patients with suspected dengue fever

attending at the outdoor/emergency or admitted indoor were taken as case. Data were collected from hospital records. Study protocol was approval by the Institutional Review Board and informed consent were taken from the subjects. All the relevant data regarding history and examination findings of the patients, the laboratory reports were collected. Statistical package for social science (SPSS) version 22, a computer-based software was used for all data entry and statistical analysis.

Results

Total 292 dengue patients were enrolled in this study. Mean age of all patient was 35.63±15.22 years (11-85 year) with male predominance (54.8%). Maximum patients were hailed from urban residence (83.9%), non-smoker (73.6%), had active lifestyle (63.4%) and normal body mass index (68.5%). Overall, 65.1% patients had no comorbidity and 89.4% had no concurrent acute illness. [Table 1]

Majority of the patients had high grade fever (76%) for 2-5 days (71%). Bodyache (63.7%), headache (42.1%), vomiting (41.1%), loose motion (16.8%) and abdominal pain (14.7%) were the top five chief complaints along with fever. Most of the patients had normal systolic (86.3%) and diastolic (92.5%) blood pressure. [Table 2]

Table 1. Demographic profile of dengue patients (n=292)

Variables	n (%)/ Mean±SD
Age (in years)	35.63±15.22
<21	49 (16.8)
21-30	96 (32.9)
31-40	45 (15.4)
41-50	47 (16.1)
51-60	30 (10.3)
>60	25 (8.6)
Gender	
Male	160 (54.8)
Female	132 (45.2)
Residence	
Rural	47 (16.1)
Urban	245 (83.9)
Education	
Illiterate	12 (4.1)
Primary	15 (5.1)

Secondary	46 (15.8)
Higher secondary	90 (30.8)
Graduate and above	129 (44.2)
Occupation	
Unemployed	2 (0.7)
Student	87 (29.8)
Housewife	69 (23.6)
Farmer	3 (1.0)
Businessman	31 (10.6)
Service	82 (28.1)
Retired	8 (2.7)
Others	10 (3.4)
Monthly family income (in taka)	
<10000	70 (24)
10001-30000	104 (35.6)
>30000	118 (40.4)
History of previous dengue infection	9 (3.1)
Lifestyle	
Sedentary	107 (36.6)
Active	185 (63.4)
Smoking history	
Current	54 (18.5)
Ex-smoker	23 (7.9)
Non-smoker	215 (73.6)
BMI (in kg/m^2)	
<18.5	3 (1.0)
18.5-24.9	200 (68.5)
25-29.9	65 (22.3)
30-39.9	24 (8.2)
Comorbidities*	
None	190 (65.1)
DM	75 (25.7)
HTN	47 (16.1)
IHD	3 (1.0)
CKD	4 (1.4)

Dyslipidaemia	21 (7.2)
Hypothyroidism	14 (4.8)
Concurrent acute illness	
None	261 (89.4)
AMI	2 (0.7)
Pneumonia	5 (1.7)
UTI	9 (3.1)
Others	15 (5.1)

*multiple response

Table 2. Clinical profile of dengue patients (n=292)

Variables	n (%)
Fever	
High grade (>102^{o}F)	222 (76.0)
Low grade	40 (13.7)
Intermittent	30 (10.3)
Duration of fever	
1 day	26 (8.9)
2-3 days	111 (38.0)
4-5 days	98 (33.6)
>5 days	57 (19.5)
Bodyache	186 (63.7)
Vomiting	120 (41.1)
Headache	123 (42.1)
Runny nose	7 (2.4)
Retro-orbital pain	27 (9.2)
Loose motion	49 (16.8)
Abdominal pain	43 (14.7)
Respiratory distress	11 (3.8)
Gum bleeding	3 (1.0)
Black stool	5 (1.7)
Epistaxis	1 (0.3)
Haemoptysis	2 (0.7)
Hematemesis	5 (1.7)
Leg swelling	8 (2.7)
Diminished conscious level	7 (2.4)
Systolic blood pressure (mmHg)	
<90	15 (5.1)
90-139	252 (86.3)
140-159	20 (6.8)
≥160	5 (1.7)
Diastolic blood pressure (mmHg)	
<60	11 (3.8)

60-90	270 (92.5)
90-120	10 (3.4)
>120	1 (0.3)
Pulse pressure (mmHg)	
<20	10 (3.4)
20-30	88 (30.1)
30-50	190 (65.1)
>50	4 (1.4)

Discussion

This retrospective observational study was analyzed the hospital records of dengue fever cases of BIRDEM General Hospital, Dhaka from June 2019 to December2019. This study was performed to find out the socio-demographic pattern and clinical parameters of dengue patients of Bangladesh in 2019. It was found that majority of the infected patients were male, urban resident, belonged to the age group of below 40 years. Diabetes mellitus (DM) was the major comorbidities among the patients followed by hypertension (HTN). Fever was the most common symptom observed in almost all the patients and most of the cases report to hospital after 4 days after fever onset. Most of them suffer from high grade fever which is typical for this kind of fever. Study features of this retrospective analysis may have clinical implications by exploiting them in the management of future dengue outbreak and it will help policy maker in taking decision for better patient care and in raising awareness among general population.

Dengue was fairly unfamiliar disease in Bangladesh when first outbreak occurred in 2000. The pronounced morbidity and unacceptable mortality during early years were taken care with great rapidity by health care system. The impact of the illness due to Dengue on our health care system has made it very familiar in our society. The disease is very much related to our environment, economy and national policy. Each year, thousands of dengue infections are reported and there are several outbreaks of dengue emerge in several countries including Bangladesh and this certifies the global importance of this infection. Fighting with dengue outbreak is important in public health. Normally, patients in dengue outbreak usually present the classical symptoms, acute febrile illness hemorrhagic complication. However, some outbreaks present uncommon clinical presentations might be problematic in diagnoses.

Mean age of all patient in our study was 35.63±15.22 years (11-85 year) with male predominance (54.8%). About two third (65.1%) ou our total study population were below 40 years of age and only 8.6% patients were more than 60 years of age. These findings match the study findings of Prattay KMR et. al. Their study showed that majority of the cases (73.33%) were found between the ages of 18 and 40. Age groups of 41–60 years and <18 years were

presented with 15.24% and 9.52% of cases respectively while the least percentage of cases (1.90%) were exhibited by patients >60 years of age (Prattay KMR et.al, 2022). These findings matches with our study as both the study were done somewhat in similar time and from same city of Bangladesh. In contrast to our study there are some previous studies done in Bangladesh, where most of the cases were from paediatric age group (Amin MMM et.al, 1999; younus et.al, 2001). This findings may be due to most of the cases are sporadic and and there were few reported cases in adult population. Another thing is that patients reported in our study were taken from a tertiary care hospital which is mostly specialized for adult diabetic population. Another explanation may be due to lack of herd immunity from DENV3 and DENV4 among these age groups as these two strain are more prevalent in this year where in previous years DENV1 and DENV2 were prevalent.

In this study, male patients outnumbered the female ones with 54.8% male and 45.2% female which matches many of previous studies (Prattay KMR et al. 2022; Karunakaran et al. 2014; Sharmin2015, Alam 2009). This type of sex differencesmay be due to social background of the Asian countries. Males in this region are more likely to work outdoor rendering more exposed to the mosquito bites during day time either at their workplaces or while travelling. Moreover male patients have greater chance to go for health care facilities in Bangladesh. Reportedly, men attend or are taken to the health services more frequently than woman both in rural and urban areas and hence even if there was an equality in the number of incident dengue cases, this could have affected the reported figures. In contrast in some South American studies (Garcia 2003, Kaplan 1980) an opposite scenario was observed where the female dengue cases were either equal or higher than that of male. These may be due to their social circumstances where females outdoor activities outnumber males.

Maximum patients of our study were hailed from urban residence (83.9%) and only 16.1 % were from rural area. This may be due to that our study center is a tertiary care hospital of a megacity of the country and it is situated at the heart of the city. Thus this study figure out a major regional difference in the frequency of the disease occurrence which will help policy maker to take action regarding prevention of Dengue outbreak in near future. These findings also matches with some recent studies (Patil 2020, Hasan 2021). Urban environment acts as better habitat for Aaedes aegypti. However, the fact that our concerned hospital was city-based and that the financial status, awareness and access to the health facilities of city dwellers are superior to that of rural people which may also contribute to this finding.

More than three fourth of our study population (76.3%) were non smoker with only 23.7% of them were either smoker or ex-smoker. But with extensive literature search we didn't find any correlation with smoking and dengue fever. But a study done by Pamukcu et al. showed that cigarette smoking may increase platelet aggregation and cause atherothrombotic cardiovascular events (Pamukcu et al, 2011).

Nearly two third (63.4%) of our patient lead active lifestyle where only 36.6% patients were sedentary. These findings may explain the sociodemographic status of our country. As most of our study population were male and our social structure is of male predominant where male partner used to do the maximum outdoor activities rendering more exposed by mosquito bites during day time. Another explanation is that traditional medical practices and home remedies were widely perceived and experienced among our female population which refrain them from seeking institutional care for DF.Wide use of unconventional therapy for DF warrants the need to enlighten the public to limit their reliance on unproven alternative treatments.

We didn't find any relationship with socioeconomic conditions with increased risk of dengue. This findings are some contrary to other previous studies. A study done by Farinelli et al. showed a positive relationship between low socioeconomic condition and increased risk of dengue. They studied the first dengue epidemic in a highly susceptible population at the beginning of the outbreak at Sao Paulo and therefore it may have allowed to identify an association between low socioeconomic conditions and increased risk of dengue (Farinelli et al, 2018). Our findings was contrary to their findings, a possible explanation may be we had done our study in a tertiary care private hospital and due to the expenses it is not affordable to all group to attend this hospital. Further multicenter study including some public hospital and community clinic may remove this error.

Maximum patients were hailed from urban residence (83.9%) with only 16.1% from rural area. Most strikingly, our findings points out a major regional difference in the frequency of the disease occurrence. More than four fifth patients were found to be coming from urban area which conforms to the findings of several other recent studies(Hasan 2021, Patil 2020, Prattay 2022). Urban environment acts as better habitat for Aaedes aegypti. The dengue viruses have fully adapted to a human-Aedes aegypti-human transmission cycle, in the large urban centers of the tropics, where crowded human populations live in intimate association with equally large mosquito populations. Moreover our study site was city-based and that the financial status, awareness and access to the health facilities of city dwellers are superior to that of rural people which may also contribute to this finding.

But a study by Wolf-Peter Schmidt from the Nagasaki Institute of Tropical Medicine, Japan, analyzed a population in a rural Vietnam that was affected by two dengue epidemics between January 2005 and June 2008. Their findings showed in rural areas with low population densities, dengue risk is up to three times higher than in cities. They explains the fact as the number of mosquitoes per individual is higher in rural areas. This study showed that severe outbreaks of dengue occur within a narrow population densities with limited access to tap water, where water storage vessels provide breeding sites for the mosquitoes causing dengue fever. However, as the actual number of people who contract dengue fever in populated areas is high, urban areas still substantially contribute to dengue epidemics.

Regarding level of education and association of DF, our study showed that nearly half of the study population (44.2%) were above graduate, where only 4.1% were illiterate. This

findingsmay explain that educational level is much higher in cities compared to rural area and another thing is that it is also higher in male due to our socio demographic and religious status.
Approximately one quarter of our population were service holder (28.1%), another quarter were student (29.8%), housewife (23.6%) and only 0.7% were unemployed. After extensive literature search we didn't find any association with increased risk of DF with any occupation but a study done by Apisarnthanarak et al, found that adults are at increased risk for dengue virus infection include health care workers (HCWs) in hospitals with excess standing-water sources.
Dengue fever is a systemic disease. It has a wide spectrum of presentation comprising both severe and non-severe clinical manifestations (Rigau-Perez JG et al. 1997). After a short incubation period, the disease turns abruptly followed by the three phases - febrile, critical and recovery. Primary infection especially in naïve patient usually develop an indistinguishable simple viral fever accompanied by a maculopapular rashe. Some may suffer from mild upper respiratory and gastrointestinal symptoms. Usually there is a sudden sharp rise in temperature, frequently associated with a flushed face and headache. Occasionally, chills accompany the sudden rise in temperature.
Our study showed majority of the patients had high grade fever (76%) for 2-5 days (71%). Bodyache (63.7%), headache (42.1%), vomiting (41.1%), loose motion (16.8%) and abdominal pain (14.7%) were the top five chief complaints along with fever. A study done by Karunakaran et al. showed that most common symptoms among all patients, in addition to fever were myalgia, hemorrhagic manifestations and vomiting, which were observed in 58%, 36% and 32% of the patients, respectively. The most common symptom in the survivors was myalgia, whereas hemorrhagic manifestations were the most common symptoms among those who died of dengue. Among the symptoms assessed, chills, constipation, abdominal pain, bleeding, decreased urine output and restlessness were found in a higher percentage of the cases than in the controls (Karunakaran et al. 2014). Another study from the same city at same time frame by Prattay et al. also showed similar trend where fever (98%) was the most common clinical sign followed by body ache (39.28%), vomiting (29.5%), headache (21.1%), anorexia (17.9%) and abdominal pain (12.2%) (Prattay et al. 2022). All the findings were somewhat similar to our study, the main reason behind this may be due to sharing almost similar geographical location.
In our study most of the patient (76%) presented with high grade fever followed by low grade in 13.7% and intermediate grade fever in 10.3% of patient. Regarding duration of fever most of the patient comes to hospital after the initial febrile phase that is 38% on the 2^{nd} and 3^{rd} day as well as 33.6% on 4^{th} and 5^{th} day. A major amount (19.5%) present to hospital after 5 days. Only 8.9% of patient present on the first day of fever.

From literature search it had found that patients typically develop sudden high-grade fever which usually lasts 2–7 days and is often accompanied by facial flushing, skin erythema, generalized body ache, myalgia, arthralgia and headache (Rigau-Perez JG et al. 1997). Some patients may suffer from sore throat, mild pharyngitis and conjunctivitis. GI symptoms like anorexia, nausea

and vomiting are also frequent finding. In the early febrile phase distinguish dengue clinically from other febrile illness is very difficult. A positive tourniquet test in this phase may help in this regard (Kalayanarooj S et al. 1997). But the problem is that these clinical features rarely differentiate severe and non-severe dengue cases. So that meticulous search for warning signs and other clinical parameters is crucial to recognizing progression to the critical phase. In some case petechiae and mucosal membrane bleeding (e.g. nose and gums) like mild haemorrhagic manifestations may be seen (Kalayanarooj S et al. 1997). Some author also report massive vaginal bleeding and GI bleeding during this phase (Balmaseda A et al.2005). There are some reports of hepatic involvement after a few days of fever (Kalayanarooj S et al. 1997).

Though DF presents with complex manifestations but treatment is relatively simple, inexpensive, and very effective in saving lives if correct intervention can implement in timely manner. Early detection of the cases, its classification, treatment, and referral in an organized manner can reducing dengue mortality to a great number. If we can ensure delivery of optimal clinical services at all levels of health care, from primary to tertiary the morbidity and mortality rate can reduce further. Most dengue patients recover without requiring hospital admission while some may progress to severe disease.

Limitations

Among the several limitations one limitation of the present study need to be considered that is the relatively small sample size from one healthcare facility. Future multicenter study with a larger sample size is being designed to enhance the interpretation of results, and ultimately strengthen conclusions. In addition, as it was a retrospective study where data were collected from patients' medical record, sometimes there were random missing data which were not recorded appropriately in the patients' medical record file by the designated persons. Despite these limitations, the study gave an insight into the important clinical indications and implications in the management of dengue in Bangladesh as well as in other South Asian countries.

Conclusion

Fighting with dengue outbreak is important in public health. Normally, patients in dengue outbreak usually present the classical symptoms, acute febrile illness hemorrhagic complication. However, some outbreaks present uncommon clinical presentations might be problematic in diagnoses. The severity of infection varies in different outbreak. The mortality in different outbreaks are usually different. The medical facilities and skill of local practitioner important determinants of outcome of dengue case management. It is also been influenced by fields such as economy, health system and environmental indices. This highlights the need of the knowledge on clinical management of dengue illness. Although the results of this study cannot be generalized to other cities of Bangladesh, our findings will allow public health agencies in Bangladesh to concentrate their efforts to battle dengue and also suggests that monitoring where Aedes are found will help identify populations at risk. Our study will guide doctors of all level to

early diagnose dengue patient and will help them to detect the severe cases early. So that early intervention can decrease the morbidity and mortality.

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