Journal of Bangladesh College of Physicians and Surgeons
Vol. 41, Dengue Fever Supplement Issue, October 2023

Demographic Profile of Patients with Dengue Fever Presented in a Tertiary Care Hospital of Bangladesh

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Abstract:

Background: ***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 was to determine the sociodemographic variables of patient suffering from DF during an epidemic outbreak.***

Methods: ***This hospital review analyzed the hospital records of DF cases of BIRDEM General Hospital, Dhaka from June 2019 to December 2019. Patients with suspected dengue fever attending at the outdoor/emergency or admitted indoor were taken as study subjects. Data were collected from hospital records. Study protocol was approved by the Institutional Review Board. 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, was used for 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 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.***

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 against dengue.***

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

(J Bangladesh Coll Phys Surg 2023; 41: 63-68)
DOI: https://doi.org/10.3329/jbcps.v41i4069715

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.[1] 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[2] 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[3]. Relationships can be non-linear, specific to particular

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Received: 15 Oct., 2023 **Accepted:** 19 Oct., 2023

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.

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 demography 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.[4]

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.[5] 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[6] 70% of the actual burden is in Asia.[6,7] 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(WHO fact sheet 2020). 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.[8]

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.[9]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 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.[10]

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. So this hospital review analyzed the hospital records of DF cases of BIRDEM General Hospital, Dhaka from June 2019 to December 2019. Patients with suspected dengue fever attending at the outdoor/emergency or admitted indoor were taken as study subjects. Data were collected from hospital records. Study protocol was approved by the Institutional Review Board. 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, was used for 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 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).

Table-I

Demographic profile of dengue patien ts (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	
Nil	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

Discussion:

This retrospective observational study was analyzed the hospital records of dengue fever cases of BIRDEM General Hospital, Dhaka from June 2019 to December2019. Study protocol was approved by the Institutional Review Board prior to start data collection. 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). 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 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 over 35 years with male predominance. About two third of 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.[11] 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.[11]

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 which matches many of previous studies.[11-14]This type of sex differences may 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 [15,16] 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 female's outdoor activities outnumber males.

Maximum patients of our study were from urban residence. This is 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.[17,18] 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.

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 family members 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.

We did not analyze any relationship with socioeconomic conditions with increased risk of dengue. A study done by Farinelli et al. showed a positive relationship between low socioeconomic condition and increased risk of dengue.[19] 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. Further study including some public hospital and community clinic may remove this error.

Regarding level of education and association of DF, our study showed that nearly half of the study population were graduate, where only 4.1% were illiterate. This findings may 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, another quarter were student, housewife and only 0.7% were unemployed. After extensive literature search we did not 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.[20]

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.

Conflict of Interest: None

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