Original Article

Clinical Dengue among Travelers and Non-Travelers in Greater Barishal

MZ Hussain[1], AJME Kayesh[2], SA Kader[3], SMFR Khan[4], A Sarker[5], A Bhattacharyya[6], MT Razzaque[7]

ABSTRACT: *Dengue fever is a mosquito borne disease caused by an arbovirus and expansion of dengue fever to new countries and, from urban to rural settings constitutes an important health problem in the world including Bangladesh. The incidence of dengue infection in Barishal division with and without travel history to known endemic area has been investigated in the current cross sectional study in Sher-e-Bangla medical College Hospital in August, 2019in sample size of 212 admitted patents of whom 138 (65.1%) were male, 74 (34.9 %) were female,116 (54.7%) of patients traveled to a known endemic zone, 96 (45.3%) did not; 206 (97.2%) were NS1 positive, 4 (1.9%) were IgM positive, 2 (0.9%) were IgM positive and IgG positive; Of travelling 116 patients, 92(79.3%) were male, 24(20.7%) were female and among the non-travelling96 patients 46(47.9%) were male, 50(52.1%) were female. This study concluded that Dengue is spreading to previously non-endemic zones like greater Barishal and travelers hold the major share of disease burden. Male preponderance in traveling to endemic zone was statistically significant (p=0.001).*

Keywords: *Dengue, Aedes aegypti, Serotype, NS1 antigen, Enedemic*

(The Planet 2018; 2(2):12-17)

INTRODUCTION:

Dengue is the most important arthropod transmitted human viral disease, most rapidly spreading mosquito-borne viral disease in the world. In the 50 years from the mid-twentieth century to the beginning of the twenty-first century, incidence has increased 30-fold with increasing geographic expansion to new countries and, in the present decade, from urban to rural settings constituting an important health problem in the world including Bangladesh. There are four dengue virus serotypes which are designated as DENV-1, DENV-2, DENV 3, and DENV-4. Infection with anyone of these serotypes confers lifelong immunity to that virus serotype. Although all four serotypes are antigenically similar yet they elicit cross protection for only few months. Secondary infection with another serotype or multiple infection with different

1. Assistant Professor, Medicine, Sher-e-Bangla Medical College, Barishal, Bangladesh
2. Assistant Professor, Medicine, Sher-e-Bangla Medical College, Barishal, Bangladesh
3. Assistant Professor, Endocrinology, Sher-e-Bangla Medical College, Barishal, Bangladesh
4. RP (Medicine), SBMCH
5. Assistant Professor, Neuro Medicine, Sher-e-Bangla Medical College, Barishal, Bangladesh
6. Associate Professor, Hepatology
7. Intern Doctor, Sher-e-Bangla Medical College, Barishal, Bangladesh

serotypes enhance chances of occurring more severe form of diseases.

Aedes aegypti and *Aedes albopictus* are the two most important vectors of dengue but *Aedes aegypti* is highly domesticated and strongly anthropophilic. *Aedes albopictus* is an aggressive feeder and can take the amount of blood they need for each gonotropic cycle in one bite. They usually are distributed in the peripheral areas of urban cities. It prefers natural larval habitats which include tree holes, latex collecting cups in rubber plantations, leaf axils, bamboo stumps, coconut shells, etc. However, breeding has been reported recently in domestic habitats as well. The eggs of aedes mosquito can remain in a viable dry condition for more than a year and emerge within 24 hours once it comes in contact with water. This is also a major hurdle in prevention and control of dengue.The female *Aedes* mosquito usually becomes infected with the dengue virus when it takes a blood meal from a person during the acute febrile (viremia) phase of dengue illness. After an extrinsic incubation period of 8 to 10 days, the mosquito becomes infected. The virus is transmitted when the infected female mosquito bites and injects its saliva into the wound of the person bitten. The cycle of dengue continues by this process. Dengue begins abruptly after an intrinsic incubation period of 4 to 7 days (range3–14 days). There is also evidence of vertical transmission of dengue virus from infected female mosquitoes to the next generation.

Dengue is a systemic and dynamic infectious disease which may be asymptomatic or present itself with a broad clinical spectrum. After the incubation period (4 to 10 days), the illness begins abruptly and is followed by three phases—febrile, critical, and recovery. Principles of case classification can help to identify patients at risk of developing severe dengue and the requirement of hospital care.[1]Globally, reporting on dengue cases shows cyclical variation with high epidemic years and non-epidemic years. Dengue often presents in the form of large outbreaks. There is, however, also a seasonality of dengue, with outbreaks occurring in different periods of the year. This seasonality is determined by peak transmission of the disease, influenced by characteristics of host, vector, agent and environment. These relationships determine the level of endemicity in an area. Temperatures in the range of 25 C ± 5 C, relative humidity around 80% and innumerable small water collections result high transmission.

MATERIALS AND METHOD:

Study design and participants

A cross sectional descriptive type of observational study was conducted among 212 patients with clinical dengue admitted in Sher-E-Bangla Medical College Hospital (SBMCH), Barishal, Bangladesh during the month of August, 2019.The patients selected purposively for the study reside in Barishal, Jhalakathi, Patuakhali and Barguna district. Data were collected by interview, physical examination and laboratory investigations of patients in a pre-prepared tabulated form by the attending doctors, checked and rechecked by the investigators to eliminate mistakes. Computer data entry and analysis were done using SPSS, version

21.0.Qualitative variables were summarized by percentage and chi-square test was used for analysis. Cross tabulation was done to compare different variables. No physical or psychological risk was associated with the study. Permission from the authority and consent of participants was taken prior conducting the study.

PROCEDURES:

A venous blood specimen of 3 mL was collected from all the consenting participants. The serum was separated mostly at the Sher-e-Bangla Medical College Hospital laboratory facility for detecting NS1 antigen if presentation within first five days of symptom. Alternatively IgM, IgM antibodies were done if presentation after five days of symptomonset.

RESULTS:

The incidence of dengue infection in Barishal division with and without travel history to known endemic area has been investigated in the current study. The total sample size was 212.

Table-1: Distribution of dengue patients by sex (n=212)

Sex	Frequency	Percentage (%)
Male	138	65.1
Female	74	34.9
Total	212	100.0
Male: Female ratio	1.9: 1	

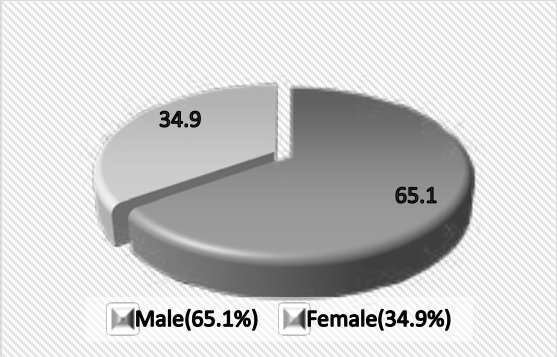

Table-1 shows distribution of admitted dengue patients by sex. Among the patients 138 (65.1%) were male, 74 (34.9 %) were female. Male: Female ratio was 1.9: 1.

Table-2: Distribution of dengue patients by diagnostic criteria (n=212)

Diagnostic criteria	Frequency	Percentage (%)
NS1 positive	206	97.2
IgM positive	4	1.9
Both IgM &IgG positive	2	0.9
Total	212	100.0

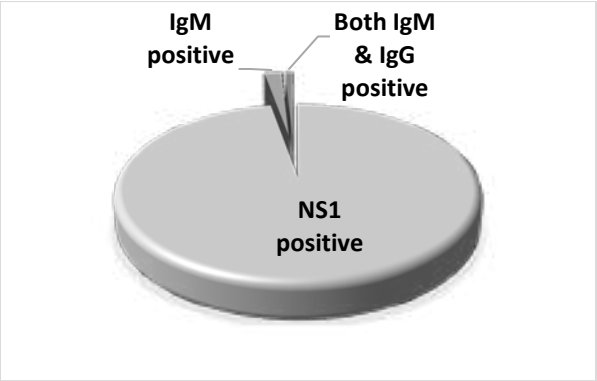

Table-2 shows distribution of dengue patients by diagnostic criteria. Among the patients 206 (97.2%) were NS1 positive, 4 (1.9%) were IgM positive, 2 (0.9%) were Both IgM &IgG positive.

Table-3: Distribution of dengue patients by travel to known endemic zone (n=212)

Travel to known endemic zone	Frequency	Percentage (%)
Yes	116	54.7
No	96	45.3
Total	212	100.0

Table-3 shows distribution of dengue patients by travel to known endemic zone. Among the patients 116 (54.7%) traveled to a known endemic zone, 96 (45.3%) did not travel to a known endemic zone.

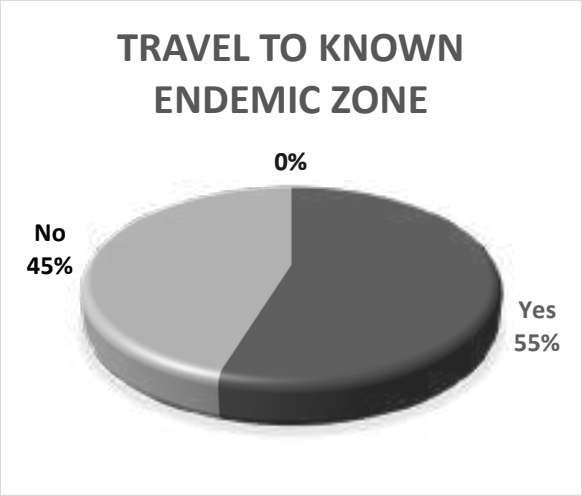

Table-4: Association of travel frequency in endemic zone with sex distribution (n=212)

Travel endemic zone	n	Male	Female	p-value
Yes	116	92(79.3%)	24(20.7%)	<0.001*
No	96	46(47.9%)	50(52.1%)	
Total	212	138(65.1%)	74(34.9%)	

*Chi-square test

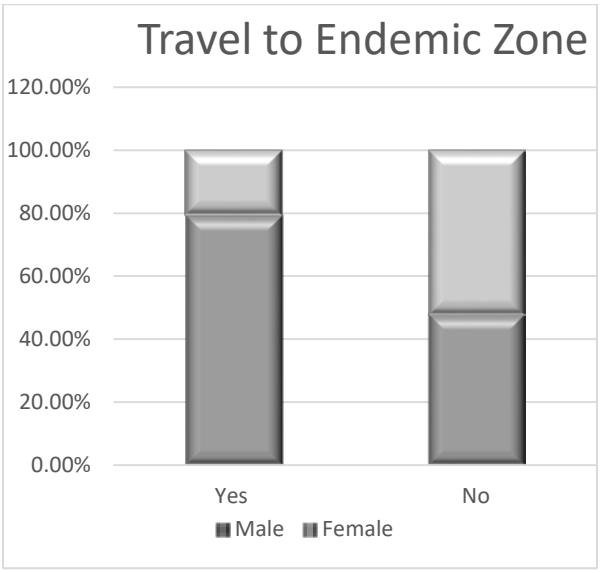

Table-4 shows association of travel frequency in endemic zone with sex distribution. Among the patients 116 traveled to endemic zone, of them92 (79.3%) were male, 24(20.7%) were female. The remaining 96patients did not travel to endemic zone, of them46 (47.9%) were male, 50(52.1%) were female. p-value was <0.001. Male preponderance in traveling to endemic zone was statistically significant.

DISCUSSION:

Before 1970, only nine countries had experienced severe dengue epidemics. Today, the disease is endemic in more than 100 countries throughout the globe. The actual numbers of dengue cases are underreported and many cases are misclassified. World Health Organization estimate indicates that 390 million dengue infections occur every year (95% credible

interval 284–528 million), of which 96 million (67–136 million) manifest clinically (with any severity of disease). A study, of the prevalence of dengue (2012), estimates that 3.9 billion people in 128 countries are at risk of infection with dengue viruses. [1]

In Bangladesh the first epidemic of dengue hemorrhagic fever occurred in mid-2000 when 5,551 dengue infections were reported from Dhaka, Chittagong, and Khulna cities, occurring mainly among adults. Among the reported cases, 4,385 (62.4%) were dengue fever (DF) infections, and 1,186 (37.6%) cases were dengue hemorrhagic fever (DHF). The case-fatality rate (CFR) was 1.7%, with 93 reported deaths. *Aedes aegypti* was identified as the main vector responsible for the epidemic, and *Aedes albopictus* was identified as a potential vector in Chittagong. According to WHO, the worst outbreak occurred in 2002, with 6,232 cases and 58 deaths. The monsoon and post monsoon in Bangladesh is peak time to develop dengue. In Bangladesh monsoon on usually happens during June and July of every year. The caseloads increase thereafter in August and September and can extends up to October. During 2015–2017, in the pre-monsoon season, the dengue cases were reported to be more than seven times higher compared to the previous 14 years. The findings closely correlate with those of the pre-monsoon Aedes vector survey which revealed the presence of high density of larva and pupa of the dengue vectors in the environment all the year round. In our study, climate changes, such as average rainfall, humidity, and temperature, after 2014, and rapid unplanned urbanization were the strong predictors of an imbalance in the existing ecology that has led to increase in dengue cases in 2016 and the emergence of the chikungunya virus for the first time in Bangladesh in 2017.[4] The seasonal prevalence of Dengue had been in restricted in Dhaka and surrounding areas. But the recent years have seen significant increase in the incidence of clinical Dengue far away from Dhaka.

The prevalent serotypes of dengue until 2000 in Bangladesh were: DENV1, DENV2, and DENV3, with the highest number of reported cases attributed to DENV-3. A similar situation can be seen in other countries, such as India and Sri Lanka, where DENV-3 has been reported most of the time in DF/DHF-related illnesses. Over the last 10-15 years, dengue fever and dengue hemorrhagic fever.

The incidence of dengue infection in Barishal division with and without travel history to known endemic area has been investigated in the current study. The total sample size was 212.Among the patients 138 (65.1%) were male, 74 (34.9 %) were female. Male: Female ratio was 1.9: 1.

In this study116 (54.7%) patients traveled to a known endemic zone,96 (45.3%) did not travel to a known endemic zone. In a survey conducted in India distribution of Dengue was found to rather sporadic.[5] In Bangladesh Dengue was previously endemic in Dhaka and surrounding area. In this study it was reavealed that only slightly more than half of the patients had history of travel to an endemic zone and near about half of

patients had no travel history to an endemic zone. Travel history to an endemic zone within 1 month prior to symptom onset was considered. Among the patients 206 (97.2%) were NS1 positive, 4 (1.9%) were IgM positive, 2 (0.9%) were both IgM positive &IgG positive.

In the study116patients traveled to endemic zone, of them92 (79.3%) were male, 24(20.7%)were female. The remaining 96patients did not travel to endemic zone, of them46(47.9%)were male,50(52.1%)were female. p-value was <0.001. Male preponderance in traveling to endemic zone was statistically significant. Expansion of this disease caused by a mosquito borne arbovirus to new countries and, from urban to rural settings constitutes an important health problem in the world including Bangladesh.

CONCLUSION:

The study results revealed that Dengue is spreading to a previously non-endemic zones like greater Barishal andtravelers hold the major share of disease burden. Male preponderance in traveling to endemic zone was statistically significant.In the coming years studies should be conducted throughout the country to determine the new endemic zones.

REFERENCE:

1. National Malaria Elimination & Aedes Transmitted Disease Control Program Disease Control Unit Directorate General of Health Services. **National Guideline for Clinical Management of Dengue Syndrome** 4th Edition. *National Malaria Elimination & Aedes Transmitted Disease Control Program Disease Control Unit Directorate General of Health Services,* Mohakhali, Dhaka-1212. 2018
2. World Health Organization (WHO) and the Special Programme for Researchand Training in Tropical Diseases (TDR).**Dengue: guidelines for diagnosis, treatment, prevention and control** -- New edition. A joint publication of the World Health Organization (WHO) and the Special Programme for Researchand Training in Tropical Diseases (TDR). 2009.
3. Control Room, DGHS.**Trend analysis of reported dengue cases and deaths by years from public and private health facilities.** Control Room, DGHS, 2000–2017.
4. Mutsuddy P, Tahmina S, Shamsuzzaman AKM, Kaisar SMG, Khan MNA.**Dengue Situation in Bangladesh: An Epidemiological Shift in terms of Morbidity and Mortality.***Canadian Journal of Infectious Diseases and Medical Microbiology,*2019. Article ID 3516284, 12 pages. https://doi.org/10.1155/2019/3516284; accessed on 07 Sep,2019.
5. Murhekar MV, KamarajP, KumarMS, KhanSA, Allam RR, BardeP, et al.**Burden of dengue infection in India, 2017: a cross-sectionalpopulation based serosurvey.** Lancet Glob Health 2019;7: e1065–73. Published **Online**June 11, 2019http://dx.doi.org/10.1016/S2214-109X(19)30250-5; accessed on 08 Sep, 2019.