

Seroprevalence of Dengue Fever in Chittagong, Bangladesh

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How to cite this article:

Sultana N, Biswas SK, Sultan T, Ahmed S,
Hossain Z, Chowdhury R. Seroprevalence of
dengue fever in Chittagong, Bangladesh. *Chatt Maa
Shi Hosp Med Coll J* 2013; 12(1): 38–40.

Abstract

Background: Dengue is a growing public health problem globally including Bangladesh. This study is carried out to find out the seroprevalence of dengue fever in Chittagong. **Methods:** About 1181 serum samples were tested from suspected dengue patients for IgM and IgG antibodies by immunochromatographic methods. **Results:** Among them, 533 (45.13%) were seropositive. Among the seropositive cases 213 (39.96%) were IgM positive, 227 (42.59%) were IgG positive and 93 (17.45%) were both IgM and IgG positive. **Conclusions:** A high percentage of dengue positive cases among suspected patients demands early careful investigation and management.

Key words: Dengue; Fever; Dengue in Chittagong.

INTRODUCTION

During the 19th century, dengue was considered as a sporadic disease, causing epidemics at long intervals. However, dramatic changes in this pattern have occurred and currently dengue ranks as the most important mosquito-borne viral disease in the world. It may give rise to an undifferentiated fever, classical dengue fever, dengue hemorrhagic fever (DHF) or dengue shock syndrome (DSS).¹

The global prevalence of dengue fever spectrum has grown dramatically in recent decades. Every year about 50–100 million cases of dengue infection and 500,000 cases of DHF occur worldwide.² The case fatality rate is found to be around 5% for DHF and DSS.³ Although dengue has a global distribution, Southeast Asian region together with Western Pacific region bears nearly 75% of current global disease burden. The Southeast Asian region is currently experiencing an upsurge in reported cases of dengue in a number of countries including Bangladesh, India, Sri Lanka and Thailand.⁴

Dengue fever was reported in Bangladesh in 1964 when it was known as “Dacca fever”⁵ and since then it has remained endemic. The seroprevalence was found to be 13% in 1997.⁶ In 2000, the reported dengue cases were 5,551 with 93 deaths in different hospitals of Bangladesh. It was then declared as an outbreak of dengue at the national level.⁷

Dengue fever is an acute infectious disease caused by arbovirus in the flavivirus genus. Four viral serotypes exists (DEN-1, DEN-2, DEN-3 and DEN-4). Infection with one serotype confers long immunity against that particular serotype only with very little cross-immunity.³ In fact, infection with other serotypes may lead to DHF or DSS during the second attack. Residual antibodies produced during the first

infection are unable to neutralize a second infection with another serotype and the second infection, under the influence of enhancing antibodies, results in severe infection and disease. This phenomenon is referred to as antibody-dependent enhancement.² The virus is transmitted to susceptible humans by bites of *Aedes aegypti* and *Aedes albopictus* mosquito spp. found worldwide. But most of the dengue infection cases occur in tropical and subtropical regions, particularly in urban and semi-urban areas. Temperature, humidity and rainfall are crucial with respect to reproduction of the vector, its survival and infectiousness.³

The case fatality rate of patients with DHF and DSS can be as high as 44%. Hence, early and rapid laboratory diagnosis of dengue is crucial.⁸ The early diagnosis and prompt management of DHF and DSS can reduce the morbidity and mortality rates.⁹ Rapid immunochromatographic test to detect IgM and IgG antibodies is an available, easy-to-perform and cost-effective test which allows early diagnosis and prompt management of DHF and DSS.¹⁰ Appropriate clinical management can save the lives of DHF and DSS patients and mortality can be reduced to less than 1%. It is also worthwhile for planning appropriate control strategies.⁸ Moreover, there is no clear data concerning the proportion of the population of Chittagong, Bangladesh which is susceptible to infection. The present analysis reports the seroprevalence of dengue infections occurred in Chittagong.

MATERIALS AND METHODS

In this retrospective study, blood samples from 1181 clinically suspected cases of dengue were reviewed from August 2009 to November 2010. Samples were collected and processed in Chevron Clinical Laboratory Pvt. Ltd. Panchlaish, Chittagong. About 2 to 3 ml of blood was collected from each patient using strict aseptic precautions, and serum was separated by standard methods. Collected serum was tested for IgM and IgG anti-dengue antibodies by immunochromatographic method. In this method, IgM and IgG are detected separately using an antibody capture method and gold-labeled anti-dengue virus monoclonal antibody. A positive IgM and negative IgG is indicative of primary dengue infection and a positive IgG with or without a positive IgM is indicative of active secondary infection.¹⁰

RESULTS

During the study period, 1181 serum samples were analyzed. Out of these, 533 (45.13%) samples were positive for dengue virus infection and 648 (54.87%) were negative (Table 1).

Table 1: Distribution of suspected dengue patients ($n = 1181$)

	No. of cases	Percentage
Positive	533	45.13
Negative	648	54.87
Total	1181	100

Table 2: Distribution of serologically positive dengue cases ($n = 533$)

	No. of cases	Percentage
Anti-dengue IgM positive	227	42.59
Anti-dengue IgG positive	213	39.96
Both IgM and IgG positive	93	17.45
Total	533	100

Out of 533 positive cases, only IgM anti-dengue antibody were found positive in 213 (39.96%) samples, IgG antibody were positive in 227 (42.59%) and both IgM and IgG were positive in 93 (17.45%) samples (Table 2).

DISCUSSION

Dengue is an important emerging disease of the tropical and sub-tropical regions, today. It is clear that since last decade, dengue has been occurring regularly with periodic surges in a number of cases.¹¹ The differential diagnosis associated with dengue fever include a wide variety of viral which includes Chikungunya, bacterial, Rickettsial and parasitic infections that produce a similar syndrome. A definitive diagnosis is confirmed by virus isolation and/or serology.²

The dengue antibody seroprevalence rate in this study was 45.13% which is similar to Gupta et al.,¹² in Delhi, India who found 44.56% serological confirmed cases in 2006. In a study by Ukay et al., in India, found 31.3% patients were serologically positive for dengue infection.⁸ In Chittagong Amin et al.,¹³ found 34.3% seropositive dengue patients in 2000. Our results are slightly different from their findings because of epidemiological changes in dengue infection in different locations.

In this study, we found 39.96% anti-dengue IgM positive and 42.59% anti-dengue IgG positive cases. Hossain et al., in 2003 reported 34.5% primary dengue and 65.5% secondary dengue cases in Bangladesh which is nearly similar to our study.¹⁴ Ahmed et al., in Chittagong found

63% anti-dengue IgM positive and 68% anti-dengue IgG positive cases in 2001⁷ which is different from our studies. Nagi et al.,³ in Pakistan showed 73% anti-dengue IgM positive patients in 2011 and Gupta et al., found 25.05% anti-dengue IgM positive cases in 2003, in Delhi, India.¹² This difference of results may be partially attributed to the rapid unplanned urbanization with unchecked construction activities and poor sanitation facilities contributing to a fertile breeding ground for mosquitoes. It is also true that an increase in the alertness among medical fraternity following the initial epidemic and the availability of

diagnostic tools have contributed to the increased detection of cases.⁴

CONCLUSION

Dengue viral infection is prevalent in Chittagong, although the present report is limited in terms of scope and the population studied. The results are significant enough to call for more extensive serological surveys to assess the real extent of disease burden due to dengue virus infection. A high percentage of dengue positive cases among suspected patients demands early careful investigation and management.

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