Frequency of IgG positivity against dengue fever virus in asymptomatic healthcare professionals of Pakistan

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Abstract

Dengue fever is the most common arboviral illness transmitted worldwide through Aedes mosquitoes. The spectrum of Disease varies from asymptomatic cases to undifferentiated fever, Dengue fever, Dengue Hemorrhagic Fever and Dengue Shock syndrome. This cross sectional study was done to determine the frequency of IgG positivity against dengue fever virus in asymptomatic healthcare professionals. The study was conducted in the Medical Wards of Mayo Hospital, Lahore, Pakistan over a period of six months. A sample of 3mL venous blood was collected from 200 professionals; serum was separated by and used for ELISA. Mean age of the sample was 28.5±7.7 years; 47.5% males and 52.5% females. 30.5% of them were IgG positivity while 69.5% were not. This study helped to highlight the sub-clinical cases of dengue fever in health care professionals reflecting the need for Effective disease prevention programs and Education of medical community to reduce the impact of epidemic.

KEY WORDS Dengue fever, IgG positivity, frequency, healthcare professionals, doctors, nurses, ward workers.

INTRODUCTION

Dengue fever is the most common arboviral illness transmitted worldwide, is caused with 1 of the 4 serotypes of dengue virus, family Flaviviridae, genus Flavivirus (single-stranded non-segmented RNA viruses). Dengue is transmitted by mosquitoes of the genus Aedes, which are widely distributed in subtropical and tropical areas of the world, and is classified as a major global health threat by the World Health Organization (WHO).[1]

The incubation period of dengue fever is 3-14 days.[2] Initial dengue infection may be asymptomatic (50%-90%), may result in a nonspecific febrile illness, or may produce the symptom complex of classic dengue fever (DF). A small percentage of persons who have previously been infected by one dengue serotype develop bleeding and endothelial leak upon infection with another dengue serotype. This syndrome is termed dengue hemorrhagic fever (DHF), some patients with dengue hemorrhagic fever develop shock (dengue shock syndrome) [DSS]), which may cause death.[1]

Dengue is a major cause of morbidity and mortality in tropical and subtropical regions comprising more than 100 countries. Two-fifth of world population or 2500 million peoples are now at risk for dengue, and every year approximately 50 million new cases occur worldwide. The global prevalence of dengue infection has increased dramatically in recent decades, particularly in the Americans, western Pacific and south-east Asia. Based on data from 112 national vital registration systems, 12,000 deaths in South East Asia, 4000 deaths in the Western Pacific and 2000 deaths in America for the year 2002 have been estimated to be due to dengue.[3]

Today, in several Asian countries, dengue hemorrhagic fever is a leading cause of pediatric hospitalization and death. In Thailand, periodic outbreaks of dengue have been reported throughout the country, with a large outbreak in 1987 causing more than 1,000 deaths and another in 1998 causing 424 deaths.[4] In Pakistan 1994 the first outbreak of dengue hemorrhagic fever occurred in Karachi. In successive years cases were isolated from Lahore, Chakwal, Gujarkhan, Haripur and Rawalpindi.[2] Serological methods to detect dengue antibodies have been the most commonly used diagnostic procedures. This method is reported to be as sensitive as the Hemagglutination Inhibition (HI) method.[5] Seropositivity can be assessed by an enzyme-linked immunosorbent assay (ELISA) measuring specific IgM or IgG antibodies against dengue.[4] ELISA method is generally replacing other techniques for IgM determination because of its sensitivity, potential for automation and ability to accommodate large numbers of samples.[5] ELISA is 97.5% specific and 97.9% sensitive for IgG anti dengue Ab detection[2] For the determination of IgM antibody by the

ELISA method, it has been recommended that measures be taken to eliminate IgG antibodies from current or previous flavivirus infections, since IgG antibodies may be present in excess and depress the sensitivity for the detection of IgM.[5]

The prevalence of asymptomatic infection is higher as compare to symptomatic infection the prevalence of asymptomatic infection has been reported to be 50 to 90%.[1]

In a study it was shown 79%.[2] In health care professionals including doctors, laboratory technicians and ward boys it was found to be 7.7%.[2]

Since there is no dengue vaccine available to date, the focus is on control activities such as vector elimination, insecticide spraying to prevent and interrupt outbreaks and community participation to eliminate breeding places.[4] The progression of disease depends upon early diagnosis and provision of supportive treatment. This is important because there is no specific antiviral drug available for the disease.[2]

Rationale of my study is to identify the proportion of asymptomatic health care professionals. This assessment can be important implication because IgG seropositive patient can develop severe form of dengue fever in form of DSS, DHF once they are re-exposed. This assessment can be implemented as an inexpensive tool for the prevention of re-exposure among the health care professional because they are exposed to all serotypes of dengue virus so preventive measures should be addressed properly among health care professionals to decrease mortality and morbidity of the disease.

MATERIAL AND METHODS

SETTING

This study was conducted in the Medical Wards of Mayo Hospital / King Edward Medical University, Lahore.

STUDY DESIGN

Quasi-experimental study

SAMPLE SIZE: Sample size of 200 cases was calculated with 95% confidence level 4% margin of error and taking expected percentage of IgG positivity i.e.7.7% against dengue fever virus in asymptomatic health care professionals

STUDY DURATION

Six months from October 2011 to April 2012.

SAMPLING TECHNIQUE

Non-probability purposive sampling

INCLUSION CRITERIA

1. Health care worker working in Mayo Hospital, Lahore as per operational definition.

2. Both genders

3. Age more than 12 years.

4. Currently afebrile, any body temperature above the normal oral measurement of 98.6 F (37 C) or the normal rectal temperature of 99 F is considered to be elevated.

EXCLUSION CRITERIA

1. Person who has already suffered from Dengue Fever. [on history]

2. Persons not willing to participate in the study

DATA COLLECTION PROCEDURE

A total of 200 healthcare professionals fulfilled the inclusion criteria were selected from Medical Wards of Mayo Hospital / King Edward Medical University, Lahore. The purpose of the research, risk and benefits involved with the study was explained to each subject. Informed consent was taken from all the subjects. All the subjects were interviewed according to a pre-designed Proforma (sample attached) by the researcher. All the data was kept confidential. Total 3ml of venous blood was taken aseptically. The sample was allowed to clot at room temperature for 2-3 hours and then serum was separated by centrifugation at 3000 rpm for 5 minutes and ultimately used for ELISA method. ELISA method was done in batches of 10 according to the instructions of manufacturer and the number of IgG positive cases against dengue virus was identified. Data was collected using a proforma.

STATISTICAL ANALYSIS

The collected data was entered into SPSS version 12 and analyzed accordingly. Descriptive statistics was calculated. The quantitative variables were age and temperature. These variables were presented by calculating mean and standard deviation. The qualitative variables included were gender, occupation and frequency of IgG positivity. These variables were presented in frequency and percentages.

RESULTS

The mean age of the patients was 28.5 ± 7.7 years. There were 12 (6.0%) patients in the age range of 18-20 years, 147 (73.5%) patients in the age range of 21-30 years, 25 (12.5%) patients in the age range of 31-40 years, 10 (5.0%) patients in the age range of 41-50 years and 6 (3.0%) patients in the age range of 51-55 years (Table 1).

In the distribution of patients by sex, there were 95 (47.5%) male and 105 (52.5%) female patients (Figure 1). In the distribution of patients by occupation, there were 105 (52.5%) doctors, 66 (33.0%) nurses and 29 (14.5%) ward workers (Figure 2 Table 2).

In the distribution of patients by dengue IgG positivity, there were 61 (30.5%) patients were IgG positivity and 139 (69.5%) patients were not IgG positivity (Figure 3).

Table 1 Distribution of patients by age (n=200)

Age (Years)	No. of patients	Percentage
18-20	12	6.0
21-30	147	73.5
31-40	25	12.5
41-50	10	5.0
51-55	6	3.0
Mean±SD	28.5±7.7	

Key: n Number of patients SD Standard deviation

Figure 1

Distribution of patients by sex

(n=200)

Figure 2 Table 2 Distribution of patients by occupation

(n=200)

	No. of patients	Percentage
Doctors	105	52.5
Nurses	66	33.0
Ward workers	29	14.5
Total	200	100.0

Key:

n Number of patient

Figure 3 Distribution of patients by dengue IgG positivity

(n=200)

DISCUSSION

Dengue fever has emerged as a major public health problem across the world in terms of health-cost morbidity and mortality. It is endemic in more than one hundred countries in tropical and sub-tropical regions of the globe. According to World Health Organization (WHO)6, two-fifths of world's population (i.e. 2500 million peoples) are now at risk for dengue, and annually approximately 50 million new cases of dengue fever (DF) occur worldwide with 500,000 cases of dengue hemorrhagic fever (DHF) requiring hospitalization every year and mortality rate of 2.5%. There is a dramatic increase for global prevalence of dengue fever in recent decades particularly in Americans, Western-Pacific and South-East-Asia.7 Based on data from 112 national vital registration systems, 12,000 deaths in Southeast Asia, 4,000 in Western- Pacific and 2,000 in America for the year 2002, have been estimated due to dengue fever.8

Dengue fever is a febrile illness caused by one of four antigenically different serotypes of dengue viruses (DEN-1, DEN-2, DEN-3 and DEN-4), which are the members of Flaviviridae family. It is mainly transmitted to humans via bite of Aedes aegypti mosquito.[9] Infection with a dengue virus may be clinically in-apparent or may be present as a non specific febrile illness, classical dengue fever, dengue hemorrhagic fever or dengue

shock syndrome. Although mild dengue disease and classical dengue fever contributes more than half of the total public health burden of dengue associated illness[10], more serious manifestations of dengue hemorrhagic fever and dengue shock syndrome, provide major impetus for efforts to prevent infection.[11]

In Pakistan, first outbreak of dengue fever was reported in 1994, followed by another epidemic in 2005.[12] Further outbreak occurred in upper parts of Punjab during 2003, in addition to sporadic cases discovered at Rawalpindi-Islamabad, Peshawar, Jhelum, Abbottabad, Mangla and Haripur.[13] The largest outbreak has occurred in Karachi during 2006, causing maximum mortality[14], and this was genotyupes.[10] The enzyme immunoassay (EIA) test has demonstrated 100% sensitivity for rapid serological diagnosis of dengue fever showing results up to fifteen minutes, and able to distinguish between primary and secondary dengue virus. Infections through separate determinations of IgM and IgG antibodies.

In our study the mean age of the patients was 28.5±7.7 years. As compared with the study of Zafar et al[2] the mean age of the patients was 29±5.2 years, which is comparable with our study.

In our study there were 47.5% male and 52.5% female patients. As compared with the study of Hayat et al[58] there were 66% male and 34% female patients, which is comparable with our study.

In our study, there were 52.5% doctors, 33.0% nurses and 14.5% ward workers. As compared with the study of Zafar et al[2] there were 33.3% doctors, 33.3% laboratory technicians and 33.3% ward workers, which is comparable with our study.

In our study, there were 11.5% patients were IgG positivity for dengue fever. As compared with the study of Zafar et al[2] 7.7% patients had IgG positivity for dengue fever, which is comparable with our study.

The prevalence of asymptomatic infection is higher as compare to symptomatic infection the prevalence of asymptomatic infection has been reported to be 50 to 90%.[1]

In a study it was shown 79%.[2] In health care professionals including doctors, laboratory technicians and ward boys it was found to be 7.7%.[2]

Since there is no dengue vaccine available to date, the focus is on control activities such as vector elimination, insecticide spraying to prevent and interrupt outbreaks and community participation to eliminate breeding places.[4] The progression of disease depends upon early diagnosis and provision of supportive treatment. This is important because there is no specific antiviral drug available for the disease.[2]

On the above discussion, it is concluded that effective disease prevention programs should be established. Education of medical community and general population should be done to reduce the impact of epidemic and ultimately reduce the mortality rate.

CONCLUSION

The high frequency of IgG positive professionals highlights the sub-clinical cases of dengue fever among the health care providers. Effective disease prevention programs should be established for the health personnel. Education of medical community and general population should also be done to reduce the impact of epidemic and ultimately reduce the mortality rate.

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