Original Research Article

Seroprevalence of dengue in a tertiary care center - A cross section study

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Abstract

Background: Dengue disease is an important emerging public health problem in countries of tropical and subtropical regions. Estimated annual global burden of disease is approximately 390 million infections, 96 million clinical cases, and 20 thousand deaths, with almost 34% of total dengue cases occurring in India.[4] According to recent estimates, 2_9 million dengue episodes and 5906 deaths, with an economic burden of $950 million occur annually in Southeast Asia (SEA) alone. It is known that disease intensity and disease burden is highly variable between different places within a country or region. **Methods:** Hospital based Cross sectional study, **Study setting:** Microbiology Department of tertiary care centre. **Study population:** The study population included all the Candida species sample positive cases admitted at a tertiary care center. **Sample size:** 1000 **Results:** majority of the cases were found in males 657 (65.70%) and 343 (34.30%) were from females. The maximum isolates (25%) obtained were from age group 31-40 years, followed by 21-30,41-50,11-20,0-10 and > 60 years age group 247,158,122,98,87 and 38 respectively. Anti-dengue serotype-specific neutralizing antibodies DENV-4 was most common in monotypic. Majority cases presented with DENV-1, DENV-2, DENV-3 and DENV-4 e.g 27% in Multitypic.**Conclusions:** All 4 serotypes are circulating,significant spatial heterogeneity in seroprevalence and suboptimal immunity in younger age groups.

Keywords: DENV serotypes**,** DENV-1, DENV-2, DENV-3 and DENV-4,

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INTRODUCTION

Dengue disease is an important emerging public health problem in countries of tropical and subtropical regions.[1-3] Estimated annual global burden of disease is approximately 390 million infections, 96 million clinical cases, and 20 thousand deaths, with almost 34% of total dengue cases occurring in India.[4] According to recent estimates, 2_9 million dengue episodes and 5906 deaths, with an economic burden of $950 million occur annually in Southeast Asia (SEA) alone.[5] It is known that disease intensity and disease burden is highly variable between different places within a country or region.[6]

In India, dengue is a reportable disease and all confirmed cases are expected to be reported to government of India through NVDCP, Delhi.[7] Recent studies using various models have suggested gross underreporting of dengue cases. It is estimated that each case reported may be multiplied by 200 to get fair estimate.[8,9] There are 4 antigenically distinct DENV serotypes (DENV 1±4). Dengue can result from infection with any one of four viral serotypes. Infection with one serotype provides long-term protection to that serotype, but not to others. Thus, DENV seropositive individuals could be monotypic due to primary infection or multitypic due to secondary infections. Presence ofcertain serotypes, including primary infection with DENV-3 from the SEA region and secondary infection with DENV-2, DENV-3, and DENV-4 also from the SEA region, as well as DENV-2 and

DENV-3 from non-SEA regions, increased the risk of severe dengue infections.[10] Thus, age specific distribution for different serotypes and their contributions in monotypic and multitypic cases are worthy of special consideration. Dengue infection results into subclinical disease in majority of the cases and clinical disease in about 25% cases. Proportions of asymptomatic, mild cases and severe cases are highly variable in different areas. Differential diagnosis between clinically similar diseases caused by DENV, Chikungunya virus and other febrile illnesses is almost impossible in resource limited countries like India. Therefore clinical surveillance data which already suffers with tremendous reporting bias is inadequate to estimate true burden of disease. In such situations, properly designed seroprevalence studies may adequately quantify and characterize the extent of transmission. World Health Organization (WHO) Strategic Advisory Group of Experts (SAGE) recommends that countries consider introduction of this dengue vaccine only in populations where epidemiological data indicate a high burden of disease. In order to maximize public health impact and cost effectiveness, the populations to be targeted for vaccination, as measured by seroprevalence, should be approximately 70% or greater in the age group targeted for vaccination.[11] Seroprevalence typically increases with age, and countries may choose to target vaccination to the youngest age (9 years or older) for which seroprevalence exceeds the recommended 70% threshold.[12]

Aim and Objective:

1. Prevalence of Dengue among study participants
2. To study of seroprevalence in various age groups and gender
3. To study of pattern of dengue serotype-specific neutralizing antibodies

Methodology

Study design: Hospital based Cross sectional study. **Study setting:** Microbiology department of tertiary care centre.

Study population: The study population included all the Fever cases sample will be collected such cases will be included in the study

Inclusion criteria: 1. All Fever cases will be included.

Exclusion criteria: 1. *Not will to participate*

Approval for the study: Written approval from Institutional Ethics committee was obtained beforehand. Written approval of Microbiology department was obtained. After obtaining informed verbal consent from all patients with the definitive diagnosis of dengue infections admitted to tertiary care centre included in this study.

Sample size: 1000 convenient sampling technique used for sample collection.

Sampling technique: Total population sampling technique used for data collection.All patients admitted in tertiary care center from…..to ……with fever. Explained the purpose of study and who gave consent and detailed history of fever such cases included in this study.

METHODOLOGY

Predesigned and pretested questionnaire was used to record the necessary information. Questionnaires included general information, such as age, sex, religion, occupation of parents, residential address, socioeconomic status and date of admission. Medical history- chief complain, past history, past medical history, immunosuppressant drug history, general examination, systemic examination.Explained the purpose of study and who gave consent and detailed history of fungal illness such cases included in this study. After obtaining informed verbal consent from all patients with the definitive diagnosis of dengue admitted to tertiary care centre such cases were included in the study. The data were entered in Microsoft Excel and data analysis was done by using SPSS demo version no 21 for windows. Susceptibility of antifungal agents was performed using Chi-square test, $p < 0.05$ was considered as statistical significance.

Sample collection: We collected blood samples from a total of 1000 participants. About 5 mL blood was collected from each participants in anti-coagulant free vacutainer tubes (BD Bioscience) by trained phlebotomists and kept overnight at 4ÊC. Serum samples were separated by centrifugation at 3,000 rpm for 10 minutes and stored at -80ÊC.

IgG antibody indirect ELISA: Each serum sample was tested for dengue IgG antibodies by ELISA using the commercial Panbio Dengue IgG Indirect ELISA kit (Panbio Diagnostics, Brisbane, Australia, Cat no. 01PE30) according to manufacturer's instructions. The presence of detectable IgG antibodies indicates past exposure to dengue infection. Panbio units were calculated by dividing the sample absorbance by the cut-off value and then multiplying this value by 10. Samples were considered positive if Panbio units were >11, <9 Panbio units were considered negative and if Panbio units were between 9 to 11, samples were considered equivocal and retested to confirm the result.

IgG antibody capture ELISA: An anti-dengue IgG-capture ELISA (Panbio Diagnostics, Brisbane, Australia, Cat no. 01PE10) was performed according to the manufacturer's instructions. Anti-dengue IgG Panbio units were calculated by dividing the sample absorbance by the cut-off value and then multiplying this value by 10. Using this criteria, a value of >22 Panbio units was used to identify secondary infection. <18 Panbio units were considered negative for secondary infection and if Panbio units were between 18 to 22, samples were considered equivocal and retested to confirm the result for secondary infection.[13] High Panbio units are indicative of elevated

levels of IgG antibodies which suggest that the patient has been recently exposed to dengue virus due to secondary infection.

OBSERVATIONS AND RESULTS

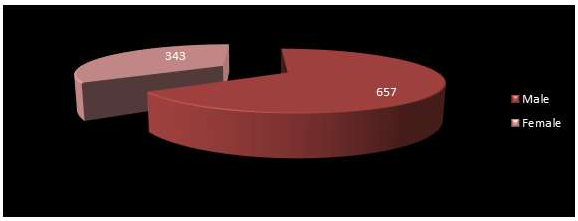

Figure 1: Distribution of Candida species cases according to Sex

The above figure 1 shows majority of the cases were found in males 657 (65.70%) and 343 (34.30%) were from females

Table 1: Distribution of participants tested positive by indirect IgG ELISA

Sr No	Age In Years	Dengue cases	Percentage
1	0-10	87	8.7%
2	11-20	122	12.2%
3	21-30	247	24.7%
4	31-40	250	25%
5	41-50	158	15.8%
6	51-60	98	9.8%
7	>60	38	3.8%
	Total	**1000**	**100**

Table 1 shows age wise distribution of patients. The maximum isolates (25%) obtained were from age group 31-40 years, followed by 21-30,41-50,11-20,0-10 and > 60 years age group 247,158,122,98,87 and 38 respectively

Table 2: Distribution pattern of dengue serotype-specific neutralizing antibodies by PRNT Monotypic

Sr No	Anti-dengue serotype-specific neutralizing antibodies (Monotypic)	Frequency	Percentage
1	DENV-1	1	7.70%
2	DENV-2	2	15.39%
3	DENV-3	2	15.39%
4	DENV-4	4	30.77%
5	Not positive for any antibody	2	15.39%
	Total	**13**	**100%**

The above table shows Anti-dengue serotype-specific neutralizing antibodies DENV-4 was most common

Table 3: Distribution pattern of dengue serotype-specific neutralizing antibodies by PRNT Multitypic

Sr No	Anti-dengue serotype-specific neutralizing antibodies (Multitypic)	Frequency	Percentage
1	DENV-1 and DENV-2	3	3%
2	DENV-2 and DENV-4	9	9%
3	DENV-2 and DENV-3	9	9%
4	DENV-1, DENV-2 and DENV-3	14	14%
5	DENV-1, DENV-2 and DENV-4	16	15%
	DENV-2, DENV-3 and DENV-4	22	
	DENV-1, DENV-2, DENV-3 and DENV-4	27	27%
	Total	**100**	**100%**

The above table shows majority cases presented with DENV-1, DENV-2, DENV-3 and DENV-4 e.g 27%

DISCUSSION

Dengue was first reported in India from Calcutta in 1912.[15] Now, it is a well established endemic disease in majority of Indian cities with occasional epidemics.[16,17] Seasonal outbreaks have been recorded from 90s in different localities of the city with hemorrhagic involvement in some cases.[18] In spite of high prevalence of clinical disease, limited information is available on prevalence and incidence of the disease in India. Another important point of the disease is that during epidemics the exposed population develops protection against the circulating serotype but not against the other serotypes, resulting in immunity that is serotype-specific. Due to the changes in the circulation of serotypes over the years, older individuals maintain the immunity they have already acquired and acquire immunity to other serotypes, but every year, newborns are likely to be susceptible to the new circulating serotype.[8,9] In this study figure 1 shows majority of the cases were found in males 657 (65.70%) and 343 (34.30%) were from females. Similar study conducted by Mishra AC *et al.* (2018) [21] He found that the 723 (50.4%) were men and 711 (49.6%).

Table 1 shows age wise distribution of patients. The maximum isolates (25%) obtained were from age group 31-40 years, followed by 21-30,41-50,11-20,0-10 and > 60 years age group 247,158,122,98,87 and 38 respectively. Similar study conducted by Mishra AC *et al.* (2018) [21] He reported that the 401(28.0%) were children 18 years and 1033 (72.0%) were adults >18 years. The age ranged from 1 month to 85 years with a mean of 31.2 years and a median of 29 years

Table 2 shows Anti-dengue serotype-specific neutralizing antibodies DENV-4 was most common. Similar study conducted by Soo KM *et al.* (2016) [10] He reported that the DENV-4 was most common found in study participants.

Table no 3 shows majority cases presented with DENV-1, DENV-2, DENV-3 and DENV-4 e.g 27%. Similar study conducted by Soo KM *et al.* (2016)[10] He reported that the cases presented with DENV-1, DENV-2, DENV-3 and DENV-4

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