Assessment of Epidemiological and Demographic Factors of Dengue

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Abstract

Introduction: Aim: To assess epidemiological and demographic factors of dengue. **Subjects and Methods:** One hundred fifteen cases of dengue virus infection among age group 18- 56 years of either gender were enrolled in this prospective, observational study. Assessment of clinical features such as headache, retro orbital pain, myalgia, arthralgia, rash, hemorrhagic manifestations, and leucopenia was recorded. Evaluation of NS1 antigen, IgM and IgG antibodies. NS1 antigen and IgM antibodies using ELISA method and IgG antibodies was performed. **Results:** Out of 115 patients, males comprised 60 (52.2%) and females 55 (47.8%). Common symptoms recorded were headache in 67%, retro orbital pain in 32%, myalgia in 52%, arthralgia in 45%, rash in 74% and bleeding in 53%. A non- significant difference between clinical features were observed (P> 0.05). NS1 was identified in 45%, IgM in 20%, IgG in 3%, NS1+ IgM in 21%, NS1+ IgG in 5% and NS1+ IgM+ IgG in 6%. **Conclusion:** Dengue infection was quite high among males as compared to females. In maximum cases, NS1 was identified followed by NS1+ IgM.

Key Words: Dengue, Hemorrhagic, Myalgia.

INTRODUCTION

Dengue fever (DF) is a leading virus causing infection in human beings. Dengue virus (DENV) is a RNA virus causing dengue related infections. There are various manifestations of dengue such as dengue fever, dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).[1] It has been observed that there is rise in dengue cases in the last few years universally. However, with the large- scale improvement in diagnosis and prompt management the death rate has declined significantly as compared to two decades ago.[2]

The genome of the virus is cleaved into three structural proteins, namely, C, prM, E and seven non-structural proteins, NS1, NS2a, NS2b, NS3, NS4a, NS4b and NS5.[3] The tests currently available for diagnosis of early dengue infections are dengue NS1 antigen detection and RT-PCR.[4] It is evident that very less number of patients advances to severe disease, characteristically revealing transient systemic vascular leak syndrome around the time of defervescence. Plasma leakage occurs, typically related with altered haemostasis and decreased platelet counts.[5] In this regard severe complications like severe liver, cardiac or neurological involvement, may also occur but are less frequent.[6] Careful observation, assessment and sensible use of intravenous fluid therapy are critical, with urgent shock resuscitation required in only a small proportion of cases.[7] However, a major issue for clinicians treating such patients remains the fact that clinical diagnosis of dengue is difficult in the early febrile phase of the illness without reliance on expensive diagnostics.[8,9] Considering this, we attempted present study to assess epidemiological and demographic factors of dengue.

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MATERIALS AND METHODS

A sum total of one hundred fifteen cases of dengue virus infection among age group 18- 56 years of either gender were enrolled in this prospective, observational study.

Demographic data of each patient was recorded in case history proforma. Assessment of clinical features such as headache, retro orbital pain, myalgia, arthralgia, rash, hemorrhagic manifestations, and leucopenia was recorded. All patients were subjected to evaluation of NS1 antigen, IgM and IgG antibodies. NS1 antigen and IgM antibodies using ELISA method and IgG antibodies were detected using lateral flow assay following the manufacturer's instructions. Results of the study was spread along MS excel sheet and using Mann Whitney U test, all the comparison was made. The level of significance was set below 0.05 as significant and below 0.01 as highly significant.

RESULTS

Table 1: Distribution of patients

Total- 115		
Gender	Male	Female
Number (%)	60 (52.2%)	55 (47.8%)

Out of 115 patients, males comprised 60 (52.2%) and females 55 (47.8%) [Table 1].

Table 2: Assessment of clinical symptoms

Clinical symptoms	Percentage	P value
Headache	67%	>0.05
Retro orbital pain	32%	
Myalgia	52%	
Arthralgia	45%	
Rash	74%	
Bleeding	53%	

Common symptoms recorded were headache in 67%, retro orbital pain in 32%, myalgia in 52%, arthralgia in 45%, rash in 74% and bleeding in 53%. A non- significant difference between clinical features were observed (P> 0.05) [Table 2, Figure 1].
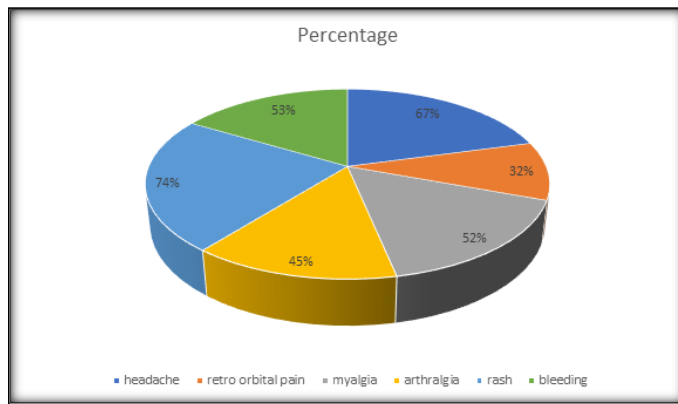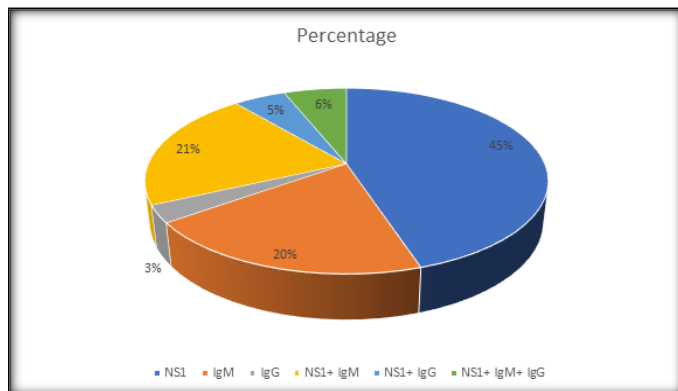
Table III Serological distribution of cases

Serological distribution	Percentage	P value
NS1	45%	<0.05
IgM	20%	
IgG	3%	
NS1+ IgM	21%	
NS1+ IgG	5%	
NS1+ IgM+ IgG	6%	

NS1 was identified in 45%, IgM in 20%, IgG in 3%, NS1+ IgM in 21%, NS1+ IgG in 5% and NS1+ IgM+ IgG in 6%. A significant difference was observed (P< 0.05)   [Table 3, Figure 2].

DISCUSSION

Dengue is caused by infection with one of four dengue virus serotypes. Infection with one serotype provides life-long immunity against re-infection by that same serotype, but not against the other serotypes.[10,11] The vast majority of dengue infections are asymptomatic but a proportion manifest as a non-specific febrile illness or progress to severe disease. Aedes aegypti is the principal mosquito vector of dengue.[12] Adult mosquitoes shelter indoors and bite during the daytime. They are adapted to breed around human dwellings, in water containers, vases, cans, old tyres and other discarded objects.[13] The secondary vector for dengue virus is Aedes albopictus, which contributes significantly to transmission in Asia and whose presence is spreading in Latin American countries.[14,15] We attempted present study to assess epidemiological and demographic factors of dengue.

Our results showed that out of 115 patients, males comprised 60 (52.2%) and females 55 (47.8%). Mangaiyarkarasi T. et al,[16] in their study 1880 patients were subjected for dengue screening by tests for NS1 antigen and IgM antibody by ELISA method and IgG antibody detection was done by rapid card test. Results showed that 32.2% (607)

were diagnosed as positive for dengue. Among them 58.2% (353) were male. The mostly affected persons were from the category 21-30yrs (9.57%) followed by 31-40 years (6.48 %). A total of 48.3% (293) were found to be reactive for dengue NS1 antigen alone whereas 22.6% (137) and 2.9% (18) are reactive for IgM and IgG respectively. A peak in the number of incidence was observed during the month of October (N=256) followed by September (N=124) and minimum was observed during January and February (N=5).

Our results showed that common symptoms recorded were headache in 67%, retro orbital pain in 32%, myalgia in 52%, arthralgia in 45%, rash in 74% and bleeding in 53%. Tripathy et al,[17] in their study found that out of 82 patients, males were 46 and females were 36. Age group 21-30 years consisted of 25 patients, age group 31-40 years had 19 patients, age group 41-50 years had 20 patients and 50-60 years had 13 patients and >60 years had 5. The difference was significant (P<0.05). Common clinical manifestations in patients were fever (71), rash (56), myalgia (48), headache (52), shock (15), bleeding (44) and GIT manifestations (76). The difference was significant (P<0.05).

We found that NS1 was identified in 45%, IgM in 20%, IgG in 3%, NS1+ IgM in 21%, NS1+ IgG in 5% and NS1+ IgM+ IgG in 6%. J RCL et al,[18] in their study among the 607 positive cases, 48.3% (293) were NS1 antigen positive which clearly indicates that they were viremic and suffering from a primary infection, i.e. they could effectively transmit the virus to the mosquito. 22.6% (137) were found to be positive only for IgM antibodies representing recent infection, 2.9% (18) were positive for only IgG which represents past infection. The IgG positivity may be due to subsequent infection with any one of the dengue serotypes during the previous outbreaks and this may have sensitized the individual to the tests.

Sharma et al,[19] found that among 667 patients enrolled, 328 (49.2%) had prolonged hospitalization. The mean hospital stay was 4.88±2.74 days. It was found that dengue hemorrhagic fever, elevated alkaline phosphatase (ALP), prolonged prothrombin time (PT), activated partial thromboplastin time (aPTT) and multiple-organ dysfunctions were independently associated with prolonged hospitalization. Overall case fatality rate was 1.1%. Factors associated with dengue mortality were age >40 years, secondary infection, comorbidities, acute kidney injury, prolonged PT, multiple-organ dysfunctions, hematocrit >20%, rhabdomyolosis and respiratory failure.

CONCLUSION

Dengue infection was quite high among males as compared to females. In maximum cases, NS1 was identified followed by NS1+ IgM.

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