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STUDY OF PREVALENCE OF DENGUE IN DIFFERENT AGE GROUPS AND SEX DISTRIBUTION AT A TERTIARY HOSPITAL

Afeeya Anjumapsar Zari[1], Shivakumar U Pujeri[2]

[1]Assistant Professor, Department of Pathology, Al ameen Medical College Vijayapura, India.
[2]MS, DNB, FAOU, DMFM, (FRM), Consultant in Fetal Medicine, Perinatology, Gynaecology and IVF Shreya Hospital, Vijayapura, Baby Science IVF Clinics, Vijayapura, India.

Corresponding Author:
Dr. Afeeya Anjumapsar Zari, Assistant Professor, Department of Pathology, Al ameen Medical College Vijayapura, India.

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Abstract

Background: Dengue is one of the most important emerging viral diseases of humans in the world afflicting humanity in terms of morbidity and mortality.. All ages and both sexes are susceptible to dengue fever. Present study was aimed to study prevalence of dengue in different age groups and sex distribution at a tertiary hospital. **Material and Methods:** Present study was prospective, observational study, conducted in patients who were diagnosed as positive for Dengue NS1 antigen or Dengue Ig-M antibodies/ IgG antibodies. **Results:** The maximum numbers of cases were in the age group of 11-20 years (36.80%), followed by in 21-30 years (21.80%). It was observed that the clinical data diagnosis of DF (77.20%) cases, DHF (18.64%) followed by DSS (4.20%). The mode of presentation in the present study was fever (100%), followed by headache (70.2%), myalgia (63%), arthralgia (48.2%), retro-orbital pain (46%), pain abdomen (21.2%), hepatomegaly (21.6%), rashes (17.4%), petechiae (13.8%), Splenomegaly (13.4%) and CNS manifestations (1.4%). Out of 500 cases (19.69%) showed positivity for NS1 antigen. The observation for individual markers IgG antibody were statistically significant with p-value of 0.001 and significant for IgM antibody with p-value of 0.03. The observations were statistically significant for combined NS1+IgM and NS1+IgM+IgG with a *p*- value of < 0.01. The maximum numbers of cases were recovered (93.6%), followed by discharged against medical advice or referred (4.6%). The patients expired were 9 (1.8%). The correlation of the clinical spectrum of dengue with died patients was significant with *p*- value was <0.05. **Conclusion:** Patients in the study presented commonly with fever, followed by headache, myalgia, arthralgia, retro-orbital pain, rash and petechiae. Clinical findings of the cases included hepatomegaly, Splenomegaly, pleural effusion, ascites and shock.

Keywords: dengue, NS1 antigen, febrile illness, dengue fever (DF), dengue hemorrhagic fever (DHF),

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Introduction

Dengue is one of the most important emerging viral diseases of humans in the world afflicting humanity in terms of morbidity and mortality. Dengue is an acute viral disease caused by a virus belonging to the broad group of Arboviruses, family Flaviviridae, subfamily Flaviviridae and genus Flavivirus.[1] Dengue fever is an acute febrile disease characterized by sudden onset of fever of 3-5 days, intense headache, myalgia, retro-orbital pain, anorexia, gastrointestinal disturbances and rash. [2]

This viral infection may be asymptomatic or may cause undifferentiated febrile illness (viral Syndrome), dengue fever (DF), or dengue hemorrhagic fever (DHF), including dengue shock syndrome (DSS).[3] Dengue Hemorrhagic Fever has a mortality rate of 2-5 %, when treated. But when left untreated the mortality rate is as high as 50 %. The first objective of the World Health Organization (WHO) global strategy (2012-2020) is to reduce dengue mortality by at least 50% and morbidity from dengue by at least 25%.[4]

Dengue virus infects humans and several species of lower primates but in India man is the only natural reservoir of infection. All ages and both sexes are susceptible to dengue fever. Secondary dengue infection is a risk factor for DHF including passively acquired antibodies in infants. Travel to dengue endemic area is an important risk factor, if the patient develops fever more than 2 weeks after travel, dengue is unlikely. Migration of patient during viremia to a non-endemic area may introduce it into the area.[5] Present study was aimed to study prevalence of dengue in different age groups and sex distribution at a tertiary hospital.

Material And Methods

Present study was prospective, observational study, conducted in department of Pathology, at Al-Ameen Medical College and Hospital, Vijayapur and District Hospital Vijayapur. India. Study duration was from December 2016 to July 2018.. Study approval was obtained from institutional ethical committee.

Inclusion criteria

- Patients who were diagnosed as positive for Dengue NS1 antigen or Dengue Ig-M antibodies/ IgG antibodies.
- Patients ready to participate in the study.

Exclusion criteria

- Patients aged less than 05 years and above and 70 years
- Serological positive cases of dengue which are also positive for other co existent infections like malaria, typhoid etc

Study was explained to patients in local language & written consent was taken for participation & study. The study population was clinically suspected cases of dengue visiting either on OPD/IPD basis with serological confirmation of either dengue specific NS1 antigen assay and /or IgM and /or IgG antibodies in Al-Ameen Medical College and Hospital, Vijayapur and District Hospital Vijayapur.

All the diagnosed as positive for Dengue NS1 antigen or Dengue Ig-M antibodies were selected. All patients socio-demographic details such as age, sex, occupation, marital status, religion, education, socio-economic status (according to the standard of living index and BG

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Prasad's classification), and per capita income were collected. Clinical examination, hematological findings and serological findings with outcome was recorded.

On admission, hematological parameters, Erythrocyte sedimentation rate, Peripheral smear, serology (by SD Bioline Dengue NS1+ Antibody Combo Card Test Kits was used to detect NS1 antigen), LFTs, RFTs, serum elctrolytes were done in all patients. The cases in the study have been classified as Anemia, Leukopenia, and Thrombocytopenia following the WHO Classification.[5] All data analysis had been done by using SPSS (version 22) for windows. The initial measures of each group were compared with the final measures of the study period and compared between the groups by using student *t test* and *chi square* test.

Results

The maximum numbers of cases were in the age group of 11-20 years (36.80%), followed by in 21-30 years (21.80%). The patients ranged from 05 to 70 years and mean age among the distribution of cases was 24.16 ±10.12 years.

Table 1: General characteristics

	No. of patients	**Percentage**
Age groups (in years)		
5-10	83	16.60
11-20	184	36.80
21-30	109	21.80
31-40	36	07.20
41-50	41	08.20
51-60	33	06.60
61-70	14	02.80
Mean age (mean ± SD)	24.16 ±10.12	

Among children males (98 cases; 19.60%) outnumbered females (92 cases; 18.40%) and male to female ratio was 1:0.93; while in adults females (157 cases; 31.40%) outnumbered males (153 cases; 30.60%) and male to female ratio was 1:1.03.

Table 2: Sex distribution of cases among adults and children:

	Sex	**No. of Cases**	**Percentage**
Adult	Male	153	30.60
	Female	157	31.40
Children	Male	98	19.60
	Female	92	18.40
Total		500	100

It was observed that the clinical data diagnosis of DF (77.20%) cases, DHF (18.64%) followed by DSS (4.20%).

Table 3: Distribution according to diagnosis of dengue cases:

Final diagnosis	**No. of Cases**	**Percentage**
DF	386	77.20
DHF	93	18.60

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DSS	21	04.20
Total	500	100

The mode of presentation in the present study was fever (100%), followed by headache (70.2%), myalgia (63%), arthralgia (48.2%), retro-orbital pain (46%), pain abdomen (21.2%), hepatomegaly (21.6%), rashes (17.4%), petechiae (13.8%), Splenomegaly (13.4%) and CNS manifestations (1.4%).

Table 4: Distribution according to clinical presentation of dengue cases:

Clinical Presentation	**No. of Cases (n=500)**	**Percentage**
Fever	500	100
Headache	351	70.2
Myalgia	315	63
Arthralgia	241	48.2
Retro-orbital pain	230	46
Vomiting	115	23
Pain abdomen	106	21.2
Rash	87	17.4
Tourniquet test	120	24
Petechiae	69	13.8
Hepatomegaly	108	21.6
Splenomegaly	67	13.4
Shock	29	5.8
Pleural effusion	23	4.6
Ascites	24	4.8
CNS manifestation	07	1.4

Out of 500 cases (19.69%) showed positivity for NS1 antigen. The observation for individual markers IgG antibody were statistically significant with p-value of 0.001 and significant for IgM antibody with p-value of 0.03. The observations were statistically significant for combined NS1+IgM and NS1+IgM+IgG with a *p*- value of < 0.01.

Table 5: Distribution of dengue cases according to serology

Test	**DF**	**%**	**DHF**	**%**	**DSS**	**%**	***p*-value**
NS1	76	19.69	11	11.83	00	0.00	0.12 (NS)
IgM	84	21.76	34	36.56	00	0.00	0.03 (S)
IgG	40	11.92	12	12.90	00	0.00	0.001 (S)
NS1+IgM	63	15.80	17	18.28	07	33.33	0.004 (S)
IgM+IgG	53	13.73	21	22.58	11	52.38	0.21 (NS)
NS1+IgM+IgG	00	0.00	00	0.00	03	14.29	0.0001 (S)

The maximum numbers of cases were recovered (93.6%), followed by discharged against medical advice or referred (4.6%). The patients expired were 9 (1.8%). The correlation of the clinical spectrum of dengue with died patients was significant with *p*- value was <0.05.

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Table 6: Correlation of Clinical spectrum and Outcome:

Outcome	No. of Cases	Percentage	DF	DHF	DSS	*p*-value
Recovered	468	93.60	382	74	12	0.09 (NS)
Expired	09	01.80	00	00	09	0.03 (S)
Discharged/Referred	23	04.60	04	19	00	0.21 (NS)
TOTAL	500	100	386	93	21	

Discussion

The most significant pathophysiologic changes among dengue virus infections are seen in DHF/DSS, due to plasma leakage from intravascular to extravascular compartments. The leakage of plasma leads to hemoconcentration, hypotension, hypoproteinemia and collection of fluid in serous cavities. The plasma leakage occurs as a result of acute increase in vascular permeability which is attributed to transient functional disturbance due to action of short acting chemical mediators. Immune reactions contribute to the formation of complexes that initiate intravascular coagulation or haemorrhagic lesions. Damage to circulatory vessels appears to occur when antigen antibody complexes activate the complement system with the release of cytokines. All these inflammatory response produces vasculopathy and also increases shock.

In the present study, the maximum numbers of cases were in the age group of 11-20 years (36.80%), followed by in 21-30 years (21.80%). This may be due to young adults are being more active outside from the home. The findings of the present study were similar to the observations by conducted by studies by Shaista Choudhary et al.,[6] (11-20 years), Vibha Gajera et al.,[7] (15-25 years) and Prathyusha et al.,[8] (9-12 years) The mean age of distribution was 23.13 years.

Among children males (98 cases; 19.60%) outnumbered females (92 cases; 18.40%) and male to female ratio was 1:0.93; while in adults females (157 cases; 31.40%) outnumbered males (153 cases; 30.60%) and male to female ratio was 1:1.03. The findings were similar to the studies conducted by Fransisca RF et al.,[9] females (53.25%) and males (46.5 %). In present and other study showed that the incidence of dengue is more common in males than females this is because males are more frequently exposed to the risk of acquiring dengue than females because of their outdoor life which they lead. Further, female in India are usually better clothed than males, hence they are less exposed.

Dengue infection is increasing proportional to increased urbanization and compromised sanitation measures. Fever associated with headache, retroorbital pain, erythematous morbilliform rash, conjunctival suffusion and itching in palms and soles along with thrombocytopenia, leucopenia, should prompt a clinician on the possibility of dengue infection. Platelet transfusions have little role in management of dengue patients. Early diagnosis, careful monitoring and proper fluid management goes a long way in reducing the mortality due to dengue hemorrhagic fever and shock syndrome.

In the present study, most common clinical feature in the present study was fever (100 cases; 100%), which correlated well with the studies by Low et al.,[10] (100%), Kalayanarooj et al.,[11] (100%), Neeraja et al.,[12] (100%), Singh et al.,[13] (100%) Baruah et al.,[14] (100%) and Kumar et al.,[15] (99.1%). Headache was observed in (70.2%) in the present study and similar

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observation was seen in the studies by Kalayanarooj et al.,[11] (77%), Neeraja et al.,[12] (74%), Malvige et al.,[16] (71.2%) and Khanna et al.,[17] (73.3%).

Myalgia was observed in (63%) in the present study. These findings correlated with the studies of Neeraja et al.,[12] (53%) and Singh et al.,[13](57.8%). Arthralgia was observed in (48.2%) in the present study which correlated with the studies of Low et al.,[10] (56.4%). Retro-orbital pain (46%) correlated well with the studies conducted by Khanna et al.,[17] (46.6%).

Hepatomegaly seen in (21.6%) of the present study as was also seen by Kularatne et al.,[18] (24%). Splenomegaly was seen in (20 cases; 20%) of the present study; however this observation did not correlate and was much higher than the studies conducted by other authors.

Pleural effusion was observed in (4.6%) and Ascites was observed in (4.8%), which correlated with studies by Giridhar P et al.,[19] (5.04%); (7.91%) Sanjay KM et al.,[20] (18.91%); (8.1%) and almost comparable to studies by Luis AVC et al.,[21] with (03 %); (03 %) for pleural effusion and Ascites respectively.

CNS manifestation was seen (1.4%) in the present study which included restlessness, drowsiness, altered sensorium loss of consciousness and encephalitis which were lower than the studies conducted by Malvige et al.,[16] (06%), Kumar et al.,[15] (11%) and Kularatne et al.,[18] (33%). Shock was observed (5.8%) dengue cases. The study was almost comparable to studies of Malavige et al.,[16] (12.96%).

The present study had (18.6%) DHF and (4.2%) DSS. The occurrence of DSS when compared with the study of Kumar et al.,[15] (7.3%) had a good correlation. The dengue cases positive for any solitary marker in the present study (65.4%) was close to observations of Ho et al.,[22] (64.7%), Neeti M et al.,[23] (53.5%) and Jaitley et al.,[24] (52.2%) The findings in present study in general, substantiate the findings as reported in earlier studies and reaffirm the use of NS-1 antigen and Ig-M/Ig-G as complimentary diagnostic tests in suspected cases of dengue infections.

In the present study, the maximum numbers of cases were recovered (93.6%), followed by discharged against medical advice or referred (4.6%). The patients expired were 9 (1.8%). Similar findings were seen in study by Rajesh Deshwal et al.,[25] (1.8%) mortality and Vibha Gajera et al.,[7] (0.77%).

Significant morbidity and mortality can result if early recognition and monitoring of severe forms are not done. If left untreated, the mortality of DHF or DSS patients may be as high as 40-50%. Early recognition of illness, careful monitoring and appropriate fluid therapy alone have decreased mortality to 1%. If shock is identified when pulse pressure starts to drop and intravenous fluids are administered, the outcome will be excellent. Recovery is fast and most patients recover in 24-48 hours without any sequelae. The outcome may not be so good if the patient develops cold extremities. Most deaths from DHF/DSS are caused by prolonged shock, massive bleeding, fluid overload and acute liver failure with encephalopathy. Severe refractory shock, DIC, ARDS, liver failure and neurological manifestations singly or in combination were the commonest causes of death in a recent series.

Conclusion

Patients in the study presented commonly with fever, followed by headache, myalgia, arthralgia, retro-orbital pain, rash and petechiae. Clinical findings of the cases included

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hepatomegaly, Splenomegaly, pleural effusion, ascites and shock. Some patients also presented with CNS manifestations like restlessness, altered consciousness or seizures. Detection of NS1 antigen and IgM & IgG antibodies were positive in all the cases of dengue when done with rapid card tests. A single NS-1 / Ig-M marker was elevated in DF cases and more than one parameter was seen elevated in DHF and DSS cases.

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