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**RESEARCH ARTICLE**

# DENGUE – A CLINICO-EPIDEMIOLOGICAL STUDY IN A TERTIARY CARE HOSPITAL OF NORTH KARNATAKA, INDIA

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**ABSTRACT**

**Objectives:** To study the clinical and epidemiological profile of dengue cases admitted at a tertiary care hospital.
**Methods:** A cross-sectional study was conducted at SDM College of Medical Sciences and Hospital on all serologically diagnosed dengue cases admitted from 1st October 2012 to 31st December 2012. The serological diagnosis was done using Rapid Immunochromatographic Card Test (RICT) in the clinical microbiology laboratory of the hospital. Detection of at least one component (NS1, IgM or IgG) was considered to be positive for sero-diagnosis. A pre-designed, pre-tested proforma was used to collect information from the patients. Data was analyzed by SPSS version 17.0 software and descriptive statistics was used.
**Results:** Majority of cases 66.2% (149) were of Dengue fever (DF) according to WHO classification and highest number of dengue cases was in the age group of < 14 years. Male (58.2%) preponderance was noted among the cases. Fever was the presenting symptom in all cases followed by vomiting (47.1%) and headache (45.3%). Hepatomegaly was noted in 27.1% and splenomegaly in 9% of the cases. The mean platelet count was lower than normal values in all the cases.
**Conclusion:** Detection of large number of cases in a short duration signifies high incidence rate. Dengue should be suspected in all cases presenting with symptoms like fever, vomiting and headache. Dengue fever (DF) is more common clinical syndrome than the most serious dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS).Dengue shock syndrome occurs more frequently in younger age group and diagnosing in children is very important. The use of Dengue RICT helps in the prompt and early diagnosis and management of the case and prevent complications of the dengue.



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## INTRODUCTION

Dengue fever is the most common of all arthropod-borne viral diseases and has emerged as a major public health problem in recent years. Though the disease has been referred to in ancient Chinese medical encyclopedia, the first case reports dates in 1789 during the epidemics Asia, Africa and North America. It was then when Benjamin Rush coined the term 'break bone fever' because of the symptoms of myalgia and arthralgia. However, the term dengue fever came into general use only after1828. (Nivedita Gupta *et al.,* 2012) Dengue viruses (DENVs) belong to family *Flaviviridae,* which is an transmitted through mosquito; *Aedes aegypti* and also by *Ae. albopictus*. There are four serotypes of the virus referred to as DENV-1, DENV-2, DENV-3 and DENV-4 which actually originated in monkeys and independently jumped to humans in Africa or Southeast Asia between 100 and 800 years ago. (Central for disease control and prevention, 2010) Each dengue virus is an encapsulated RNA virus and is composed of three structural protein genes, which encode the nucleocapsid or core (C) protein, a membrane-associated (M) protein, an enveloped (E) glycoprotein and seven non-structural (NS) proteins. (Brett *et al.,* 2007) All the four strains are capable of causing the three spectra of disease – Dengue fever (DF), Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS). (David *et al.,* 2010; Ashwinikumar *et al.,* 2010)

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Today, about 2.5 billion people live in areas where there is a risk of dengue transmission. It is endemic in over a 100 countries in Asia, the Pacific, the Americas, Africa, and the Caribbean. The World Health Organization (WHO) estimates that 50 to 100 million infections occur each year, including 500,000 DHF cases and 22,000 deaths, mostly affecting children. (Central for disease control and prevention, 2010)

In India, the first confirmed case reports of dengue dates back in the year 1940. Since then many cases have been reported from various states. (Ashwinikumar *et al.,* 2010) The first major wide spread epidemics of DHF/DSS occurred in India in 1996 involving areas around Delhi and Lucknow and then it spread to all over the country. (Nivedita Gupta *et al.,* 2012) This can be attributed to rapid urbanization, faulty water management and improper water storage practices leading to proliferation of mosquito breeding sites. As of 2012 statistics by NVBDCP, 50,222 cases have been reported out of which 242 cases died. The highest number of cases was reported from Tamil Nadu (25.5%). Around 8% of the cases were reported in Karnataka. 8.6% of the total deaths reported were from this state. (http://nvbdcp.gov.in/den-cd.html) As this region is endemic to dengue, this study was conducted to know the profile of dengue cases in this area with respect to socio-demographic and clinical profile of dengue cases admitted in the hospital and also the outcome of these cases.

## MATERIALS AND METHODS

The study was conducted at SDM College of Medical Sciences and Hospital. It was a cross-sectional study which included all serologically diagnosed dengue cases admitted in the hospital from 1st October 2012 to 31st December 2012. The serological diagnosis of a case was done using SD Duo which is a Rapid Immunochromatographic Card Test (RICT) (Standard Diagnostics, Korea) in the clinical microbiology laboratory of the hospital. It is designed to detect Dengue NS1 antigen and Dengue IgM/IgG antibodies. Detection of at least one component (NS1, IgM or IgG) was considered to be positive for sero-diagnosis. (Pramiladevi *et al.,* 2013) A total of 225 serologically diagnosed cases were interviewed by using a pre-designed, pre-tested proforma which included socio-demographic and clinical manifestations at the time of admission, general physical and systemic examination and biochemical profile. Informed consent had taken prior to the interview.

### Statistical analysis

Data was analyzed by Statistical Package of Social Sciences (SPSS version 17.0) software. Descriptive statistics was used and results were expressed in terms of numbers and percentages.

## RESULTS

Overall 225 serologically diagnosed cases were included in the study and evaluated. All these cases were classified according to WHO criteria as DF, DHF or DSS. (Nathan *et al.,* 2009) Out of the total number of cases 66.2% (149) were of DF, 32% (71) were of DHF and 2% (5) were of DSS (Table 1).

**Table 1. Distribution of Dengue cases according to WHO classification**

| Diagnosis | Number | Percentage |
|---|---|---|
| Dengue fever | 149 | 66.2% |
| DHF | 71 | 31.6% |
| DSS | 5 | 2.2% |
| Total | 225 | 100.0% |

Highest number of dengue cases was in the age group of < 14 years (102). Dengue fever cases were higher in 14- 30 years age group (49.7%) whereas DHF (74.6%) and DSS (80%) were higher in pediatric age group (< 14 years) (Table 2).

**Table 2. Age wise distribution of Dengue cases**

| Age category | Dengue fever | | DHF | | DSS | |
|---|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | Number | Percentage |
| <14 | 45 | 30.2 | 53 | 74.6 | 4 | 80 |
| 14-30 | 74 | 49.7 | 13 | 18.3 | 1 | 20 |
| 30-45 | 20 | 13.4 | 4 | 5.6 | 0 | 0 |
| 45-60 | 9 | 6.0 | 1 | 1.4 | 0 | 0 |
| >60 | 1 | 0.7 | 0 | 0 | 0 | 0 |
| Total | 149 | 100 | 71 | 100 | 5 | 100 |

Male preponderance was noted among the cases. A total of 131 (58.2%) males were affected as against 94 (41.8%) females (Figure 1).

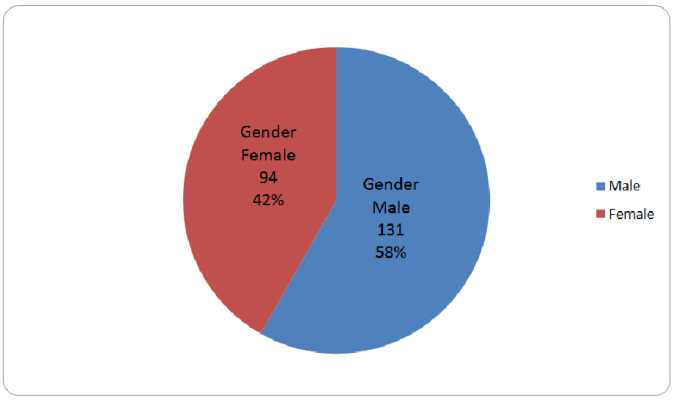


**Figure 1. Gender wise distribution of dengue cases**

The 225 dengue cases were from 7 districts of Karnataka. Koppal district was the highest affected contributing to 111 (49%) cases followed by Dharwad (46; 20.4%) (Table 3).

**Table 3. Distribution of dengue cases according to place**

| District | Number | Percentage |
|---|---|---|
| Koppal | 111 | 49.3 |
| Dharwad | 46 | 20.4 |
| Gadag | 12 | 5.3 |
| Belgaum | 32 | 14.2 |
| Haveri | 12 | 5.3 |
| Bellary | 2 | .9 |

Fever was the presenting symptom in all the 225 cases. The second common symptom among the cases was vomiting (47.1%) followed by headache (45.3%). Abdominal pain was seen in 32.8% of the cases. 19.5% of the cases presented with bleeding manifestations like gum bleeding, petechiae, melaena.

Hepatomegaly was noted in 27.1% and splenomegaly in 9% of the cases (Table 4).

**Table 4. Distribution of cases according to clinical manifestation**

| Clinical manifestation | Number | Percentage |
|---|---|---|
| Fever | 225 | 100% |
| Vomiting | 106 | 47.1 |
| Headache | 102 | 45.3 |
| Abdominal pain | 74 | 32.8 |
| Hepatomegaly | 61 | 27.1 |
| Myalgia | 54 | 24 |
| Bleeding manifestations | 38 | 19.5 |
| Generalised weakness | 35 | 15.5 |
| Cough | 25 | 11.5 |
| Splenomegaly | 21 | 9 |
| Rashes | 9 | 4.8 |
| Diarrhea | 8 | 4.4 |

The mean platelet count was lower than normal values in all the cases. Lowest mean platelet count was found to be in DSS cases (23600/cu.mm). Mean hematocrit values were 40.2 in DF cases, 39.1 in DHF and 38.1 in DSS cases (Table 5). 95% cases were treated successfully and discharged. However we lost follow up in 5% of the cases since they were discharged against medical advice.

**Table 5. Laboratory parameters of dengue cases**

| Laboratory parameters | DF | DHF | DSS |
|---|---|---|---|
| MeanHaemoglobin (gm/dl) | 13.32 | 12.99 | 12.36 |
| Mean Haematocrit (%) | 40.2 | 39.1 | 38.1 |
| Mean Total Leucocyte count (/cu.mm) | 5109.2 | 6097.0 | 4992.0 |
| Mean Platelet count(/cu.mm) | 77847.9 | 69608.0 | 23600 |
| Mean Serum Bilirubin (mg/dl) | 0.88 | 0.95 | 1.01 |
| Mean SGOT (IU/L) | 188.57 | 190.79 | 351.0 |
| Mean SGPT (IU/L) | 132.46 | 155.79 | 108.0 |

## DISCUSSION

Dengue is an important health care problem in the tropical and subtropical countries. The number of dengue cases is on the rise every year. However, mortality rate has reduced from 1.2% in 2007 to 0.25% in 2013. (Dayaraj Cecilia, 2014) This is due to the virtue of the awareness of the disease, its early diagnosis, rapid laboratory tests available for diagnosis and good patient care and management. All the 225 serologically diagnosed cases were classified according to WHO criteria into DF, DHF or DSS. The serodiagnosis was performed using a Dengue RICT, specificity of which is comparable to ELISA but the sensitivity is less. However, RICTs can be performed within a short time of 20 min compared to ELISA, cost effective, easy to perform and interpret in any resource limited setting. Rapid diagnosis of dengue is very important to start the treatment as early as possible for favorable outcome in patients. Dengue Duo card test (Standard Diagnostics, Korea) has a specificity of 100% and sensitivity of 97%. (Selvaraj Stephen *et al.,* 2014) The RICT detects NS1 antigen and IgM and IgG antibodies against dengue. Detection of any one component is concerned to be positive test and the patient can be labeled as serologically positive case of dengue. (Pramiladevi *et al.,* 2013; Selvaraj Stephen *et al.,* 2014) Hence, we included all the 225 serologically positive cases of dengue as described previously. Among these 225 cases, 66.2% (149) were of DF, 32% (71) were of DHF and 2% (5) were of DSS. These findings are consistent with Udupi and rural Maharashtra studies. (Ashwinikumar *et al.,* 2010; Batra *et al.,* 2007) Maximum number of cases were from pediatric age group accounting for 45.3%. Whereas in the study done in Udupi and Kerala, majority of the cases belonged to adult age group (15-45 years). (Ashwinikumar *et al.,* 2010; Kavitha, 2007) True endemicity is observed when children are more affected than adults. This finding reveals the fact that our study region i.e. Koppal district and nearby area, are endemic for dengue. True endemicity is observed when children are more affected than adults. The male: female ratio in this study is 1.3 : 1 which is lower when compared to study by Kumar *et al.* where the male : female ratio is 1.8 : 1. (Ashwinikumar *et al.,* 2010)

The clinical profile of the cases revealed that fever was the most common presenting symptom. It was noted in all the cases in our study. This was followed by vomiting (47.1%), headache (45.3%) and abdominal pain (32.8%). These findings have been substantiated by other studies as well, where fever, vomiting and abdominal pain are the most common symptoms. (Ashwinikumar *et al.,* 2010; Khan *et al.,* 2007; Mohan D Kashinkunti *et al.,* 2013) Headache and retro-orbital pain are considered to be cardinal features of dengue fever. However, in our study headache was seen in 45.3% of the cases and retro-orbital pain was noted only in few cases. These observations were comparable to studies by Kumar *et al.* and Kashinkunti *et al.* (Ashwinikumar *et al.,* 2010; Mohan D Kashinkunti *et al.,* 2013) In the present study, hepatomegaly (27.1%), cough (11.5%), skin rashes (4.8%) and diarrhea (4.4%) were noted less frequently when compared to study by Kumar *et al* where they report hepatomegaly (53.2%), diarrhea (13.9%), skin rash (21.7%). Whereas a study conducted in Mumbai a higher percentage of cases presented with hepatomegaly (97.4%), diarrhea (50%), rash (42%) and cough (38%). (Ashwinikumar *et al.,* 2010)

Bleeding manifestations which included gum bleeding, petechiae, malena accounted for 19.5% in our study. Kashinkunti *et al* also reported a similar percentage of patients (21%) presenting with bleeding manifestations. (Mohan D Kashinkunti *et al.,* 2013)

In the present study there were no deaths recorded. Out of 225 patients, 220 recovered after appropriate treatment and discharged. However, 5 patients were discharged against medical advice and hence we lost the follow up. According to the National Vector Borne Disease Control Programme statistics, a total of 21 dengue related deaths were reported in Karnataka in 2012. (http://nvbdcp.gov.in/den-cd.html.) Our hospital has not contributed to this toll. Early diagnosis of dengue and prompt management of the cases play the key role in the good outcome of the patients and also in preventing the complications.

The present study highlights the burden of dengue in this area. It gives an insight on the epidemiology, clinical manifestations and outcome of the disease. The limitations of our study were that it was of short duration and we used Dengue RICT to confirm the diagnosis. However, the ease and quick results provided by RICTs contributes the early diagnosis and management of the cases which is of utmost importance.

**Conclusion**

Dengue is a significant public health problem. The large number of cases detected in a short duration signifies high incidence rate and endemicity of dengue in this area. Dengue fever (DF) is more common clinical syndrome than the most serious dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). Dengue should be suspected in all cases presenting with symptoms like fever, vomiting and headache. Dengue shock syndrome occurs more frequently in younger age group and diagnosing in children is very important. The use of Dengue RICT has been encouraged by WHO and also from the present study it can be inferred that these tests help in the prompt and early diagnosis and management of the case. This in turn would help in reducing the complications as well as mortality due to this dreadful disease.

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