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# Low mortality during 2008 outbreak of dengue in Delhi, India: a clinico-biochemical study

## *Baixa mortalidade durante surto de dengue em Nova Délhi, na Índia, em 2008: um estudo clínico-bioquímico*

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**Abstract**
**Dengue has become a yearly phenomenon in Delhi. Each outbreak is distinct by way of clinical features, morbidity and mortality. The aim of this study is to analyse the clinical and biochemical profile of dengue in the 2008 outbreak at a tertiary care institution in India. We analysed the medical records of all cases diagnosed as dengue fever during the period of July 2008 to December 2008 in a tertiary care hospital. The study consisted of 103 patients - 63% patients were males. The mean age was 22 years. One third of patients had some cutaneous manifestation. 30 patients had hepatomegaly and 8 had splenomegaly. Of uncommon features 2 patients had seizures, 1 had polyserositis and one had acute hepatic failure. Raised SGPT (>60 U/L) was seen in 60% cases. 23 patients had a platelet count of less than 20,000/mm3. There were no deaths. The present outbreak primarily involved the economically productive age group. The current outbreak was characterised by high rate of hepatic involvement.**
**Keywords: Dengue – Delhi, Índia – Dengue's clinical and biochemical profile – Hepatic involvement.**

*Resumo*
*A dengue tem se tornado um fenômeno anual em Nova Deli. Cada surto é distinto do outro por meio de características clínicas, morbidade e mortalidade. O objetivo deste estudo é analisar o perfil clínico e laboratorial da dengue na epidemia de 2008 em uma instituição de atendimento terciário na Índia. Foram analisados os prontuários de todos os casos diagnosticados como dengue durante o período de julho de 2008 a dezembro de 2008 em um hospital terciário. O estudo consistiu de 103 pacientes: 63% do sexo masculino; idade média de 22 anos. Um terço dos pacientes apresentavam alguma manifestação cutânea, 30 pacientes tinham hepatomegalia e 8 tinham esplenomegalia. De características incomuns, 2 pacientes tiveram convulsões, 1 tinha poliserosite e 1 tinha insuficiência hepática aguda. Um aumento da SGPT (>60 U/L) foi observado em 60% dos casos. Vinte e três pacientes tiveram uma contagem de plaquetas inferior a 20.000/mm³. Não houve mortes. Este surto envolveu indivíduos de faixa etária economicamente produtiva. O surto também foi caracterizado pelo alto índice de comprometimento hepático.*
*Palavras-chave: Dengue – Delhi, Índia – Perfil clínico e bioquímico da dengue – comprometimento hepático.*

### INTRODUCTION

Dengue fever is an arboviral disease transmitted by*Aedes aegypti*mosquito caused by four serotypes of dengue virus, DEN 1-4. Dengue fever is endemic in many parts of North India with cases reported every year. Dengue Shock syndrome (DSS) and Dengue Hemorrhagic Fever (DHF) arethe more severe forms of the disease with considerable higher mortality and morbidity. Several epidemics of DHF/DSS have occurred in India in several states over the last five decades, the major ones in the last two decades in Delhi occurred in 1988, 1996 and 2003.[1,2,3] Cases of dengue are reported every year with cases peaking in the months of September to November when conditions are ideal for disease transmission by the vector. It has been seen that the clinical manifestations, morbidity and mortality vary from epidemic to epidemic and there are recent reports of more unusual features accompanying the dengue fever.[4] The current report is a study of all cases diagnosed as dengue fever in a tertiary care teaching hospital in National capital region during the year 2008.

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### MATERIAL AND METHODS

We examined the medical records of all patients admitted to a tertiary care hospital in Delhi, from July 2008 to January 2009 with a diagnosis of Dengue fever. The diagnosis of dengue fever was made according to the WHO criteria. An acute febrile illness with two or more of the following manifestations: headache, retro-orbital pain, myalgia, arthalgia, rash, haemorrhagic manifestations, leukopenia and a supportive serology (a positive IgM antibody) was diagnosed as DF. The serological evidence in the study population was based on IgM testing for dengue using PAN BIO ELISA. DHF was diagnosed if patients had an acute onset of fever, haemorrhagic manifestations (positive tourniquet test, petechiae/ecchymosis/ purpura, mucosal bleeding, epistaxis, gum bleeding, haematemesis, melena, hematuria, pervaginal bleeding), thrombocytopenia with platelet count <1,00,000/mm3 and any evidence of

plasma leakage due to increased capillary permeability (=20% higher hematocrit for age/ sex or =20% drop in haematocrit following treatment with fluids compared to baseline or pleural effusion/ascites/hypoprotenemia). DSS was diagnosed if apart from criteria of DHF the patient had circulatory failure.[5]

A detailed evaluation of the clinical history and the findings of physical examination of all patients was done to assess the clinical parameters including presentations, associated clinical features and hemorrhagic manifestations. Unusual presentation and uncommon manifestations were also noted. While haematological and biochemical investigations such as haemogram, packed cellvolume, platelet count, kidney function tests, liver function tests, random blood sugar and serum electrolytes wereavailable for most patients, in certain cases, as clinically appropriate other investigations including chestroentgenogram, ultrasonography of abdomen, diagnostic pleural tap etc weredone to rule outother differential diagnosis. All patients were treated according to standard WHO protocols.

**RESULTS**

One hundred and three patients fitted the WHO criteria of DF with positive IgM serology for dengue fever. Out of them, 63 (61.17%) weremale while 40 (38.83%) were females. The mean age was 22 years (minimum 8 months and maximum 70 years) The distribution of cases amongst various age groups is depicted in Table 1. This indicates that younger age groups were affected more than the aged. Therefore dengue appeared to afflict the economically productive population. The patients either belonged to Delhi (55 patients) or the adjoining states of Uttar Pradesh (45) and Haryana (3).

**Table 1.** Age distribution of dengue patients.

| Age Group (years) | Number |
|---|---|
| 0-10 | 23 |
| 11-20 | 27 |
| 21-30 | 31 |
| 31-40 | 14 |
| 41-50 | 4 |
| >50 | 4 |

Clinical features

As already described, the study included acutely febrile patients with other features of DF. Fever was associated with chills and/or rigor in about 46.6% of cases. Nausea/vomiting were very common symptoms present in almost half the case. Other common presenting complaints were headache, arthralgias and myalgias.The prominent manifestations are mentioned in Table 2. As far as hemorrhagic manifestations are concerned, rashes and petechiae were the most common ones, present respectively in 19 (18.54%) and 15 (14.56%) number of the cases. Other notable bleeding manifestations were gum bleeding, haematemesis present in a few patients, menorrhagia in one patient. Table 3 depicts the hemorrhagic manifestations in the study population. On general physical examination at presentation 23.3% had tachycardia and 5.82% were found to be hypotensive. Hepatomegaly was present in 30 patients and splenomegaly in 8 patients. As far as uncommon manifestations were concerned one patient had acute hepatic failure, one had polyserositis, and two children had convulsions.

**Table 2.** Clinical manifestations in patients with dengue.

| Symptoms | Number | Percentage |
|---|---|---|
| Fever | 103 | 100 |
| Chills/Rigors | 48 | 46.6 |
| Nausea/Vomiting | 50 | 48.5 |
| Abdominal Pain | 42 | 40.7 |
| Myalgia | 36 | 34.9 |
| Headache | 20 | 19.4 |
| Arthralgia | 10 | 9.7 |
| **Signs** | | |
| Hepatomegaly | 30 | 29.1 |
| Splenomegaly | 8 | 7.76 |
| Convulsions | 2 | 1.94 |
| Polyserositis | 1 | 0.97 |
| Acute hepatic failure | 1 | 0.97 |

**TTable 3.** Bleeding manifestations in dengue patients.

| Manifestation | Number | Percentage |
|---|---|---|
| Hematemesis | 11 | 10.68 |
| Gum bleeding | 6 | 5.84 |
| Menorrhagia | 1 | 1 |
| Hematuria | 2 | 2 |
| Petechiae | 15 | 14.56 |
| Rash | 19 | 18.54 |

Biochemical profile

On evaluation of the patients' medical records, haemoconcentration was found in 19 patients, 21.36% had leucopenia, whereas 10.6% had leukocytosis. All the patients had a platelet count less than one lakh while 23 had a platelet count of less than 20,000/mm$^3$. Most of the patients (68) had platelet counts ranging from 20 to 50 thousand. Out of the patients in whom liver functions were available 60% (42 out of 70) had an elevated SGPT (>1.5 times upper limit normal) level. 10 patients had reduced serum albumin levels (< 3g/dl). One third of the patients had a SGPT of more than 3 times of upper limit normal. Salient biochemical features of the study population are depicted in Table 4.

**DISCUSSION**

The mean age of the study population was 22 years. The maximum number of patients was seen in the age

**Table 4.** Biochemical profile of dengue patients.

| Parameters | Number | Percentage |
|---|---|---|
| Heamatocrit(>45) | 19 | 18.54 |
| Leukopenia(TLC< 4000) | 22 | 21.36 |
| Leukocytosis(TLC>11000) | 11 | 10.68 |
| SGPT(>60 IU) | 42/70 | 60 |
| SGPT (>120 IU) | 24/70 | 34.3 |
| **Platelets count** | | |
| <20,000 | 23 | 22.33 |
| 20-50,000 | 64 | 62.13 |
| >50,000-100,000 | 26 | 25.24 |

group of 20-45 years. Therefore it is apparent that dengue affects primarily the population which is in productive age group. The most plausible reason for this is because of the increased risk of serious DF in cases of re-exposure. Similar findings have also been seen in earlier studies. [2,3,6,7] A male preponderance was noted in the study group which has also been seen in earlier epidemics of dengue fever in Delhi in studies by N.P. Singh and others[3], and S. Rai and others.[8]

Rashes were the most common bleeding manifestation present in almost 19% cases and petichae in 15% cases which is approximately the same as found in the earlier epidemic in Delhi in 2003 (20%)[3], but is lower than the earlier reports of 36.7% in 1996 [9] , 35.8% from Taiwan[6], and 39.48% in 2006 [8]. Other bleeding manifestations were also found in much less number of patients when compared to these previous epidemics. Rashes and petechiae were the most common bleeding manifestations in our study as opposed to the epistaxis and gum bleeding (40%) found in 2003 [3], and epistaxis in 1998 by Sharma and others.[9]

Hepatomegaly was found in 29.2% cases in our study which was much higher than the by N.P Singh and others (10%) [3], Sharma and others (20%) [9], and by Rai et al in a study in Delhi.[8] The prevalence of splenomegaly in our study is however similar to these studies. Clinical symptoms such as arthralgia and myalgia was more frequent in the adult population than in children. Elevated SGPT levels were found in 60% (34.3% with SGPT >120) of the patients in the study which was significantly higher than the other studies by Rai and others (46.2%) [8], and 16% in a study by N.P Singh and others[3]. So the present study indicates that the cases witnessed by us in 2008 were less likely to have hemorrhagic manifestations but more likely to have accompanying hepatitis. Also another significant finding is the lack of any dengue related mortality. The reason could be due to numerous factors. As dengue has become a yearly phenomenon, early suspicion during this time of the year, improvement in the awareness and knowledge levels amongst the community and improved management practises amongst physicians might account for the reduction in mortality. Also the creation of two special dengue wards in our institute appears to have improved the management. Also the lesser number of patients presenting with life threatening manifestations especially hypotension and ARDS might have contributed to lack of any dengue deaths. However these findings need to interpreted with caution as the test used for diagnosis in our setting (ELISA) is liable to give false negative results especially during the early stages of infection when seroconversion has not occurred. The study highlights the fact that dengue has become an annual phenomenon in Delhi and more public health efforts are warranted to control this menace.

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