

Dengue fever outbreak among children in Karachi: experience at a tertiary care children hospital

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Abstract

Objective: To study the natural history of disease in terms of clinical presentation and outcome in hospitalized children with confirmed dengue cases. **Methods:** A case series study was conducted at National Institute of Child Health (NICH), Karachi from September through November 2006. Children presented with fever and presence of at least 2 clinical manifestations of suspected dengue infection according to WHO criteria were included in study. Patients were followed regarding clinical presentation, investigations, management and outcome.

Results: A total of 152 children admitted with suspicion of having dengue fever were evaluated in the study. Dengue fever antibody IgM tested on all suspected patients along with CBC, PT/aPTT, Blood C/S, Serum protein and chest X-ray. Dengue fever IgM was positive in 111 patients. A significant majority of dengue patients belonged to peri urban slums. Common presenting symptom among dengue patients was fever (100%), rash (71.17%), vomiting (52.25%), hemorrhagic manifestation (36.03%) and fits (5.40%). Among 111 dengue positive cases 65 (58.58%) were Dengue Fever (DF) cases, 40 (36.03%) were Dengue Hemorrhagic Fever (DHF) and 6 (5.4%) were cases of Dengue Shock Syndrome (DSS). Three patients expired during their stay in hospital.

Conclusion: A high percentage of dengue positive cases among suspected patients and a significant proportion of dengue hemorrhagic fever and dengue shock syndrome cases demands careful investigation and management.

Key words: Dengue Fever, Dengue Hemorrhagic Fever, Dengue Shock Syndrome

Introduction

Dengue infection has become a major international health problem as its global prevalence has increased substantially in recent decades.^{1,2} According to World Health Organization, more than 2.5 billion people are at risk of developing dengue infection.³ There is world wide occurrence of about 50 – 100 million cases of dengue infection, 500,000 cases of Dengue Hemorrhagic Fever (DHF) and about 12000 deaths every year due to dengue infection. The case fatality rate of Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) is around 5%.⁵ In Pakistan, Dengue infection was first documented in 1982 from Punjab province in 12 patients out of sample of 174.⁶ First major epidemic in Southeast Asia was reported from Srilanka in 1989.⁷ The first major outbreak of dengue fever was reported in Karachi in 1994 – 95.⁸ According to Provincial Dengue Fever Surveillance Cell, Ministry of Health, Government of Sindh, total of 4251 cases of dengue fever were diagnosed among admitted patients in different hospitals of Karachi during 2005 – 2009.² Dengue fever

is an acute infectious disease caused by arbovirus in the flavivirus genus. Four viral serotypes exists (DEN – 1, DEN – 2, DEN – 3 and DEN – 4). Infection with one serotype confers long immunity against that particular serotype only with very little cross immunity. In fact infection with another serotype the next time round may well lead to DHF and DSS.⁹⁻¹⁰ The virus is transmitted to susceptible humans by bites of *Aedes aegypti* and *Aedes albopictus* mosquito species found world wide.¹¹⁻¹³ But most of the dengue infection cases occur in tropical and subtropical regions, particularly in urban and semi urban areas. Temperature, humidity and rainfall are crucial with respect to reproduction of vector, its survival and infectiousness.¹⁴

The incubation period of dengue fever is 3 – 14 days.¹⁵ The manifestation of illness ranges from sudden onset of fever, headache, conjunctival injection, flushed facies, retrobulbar headache, backache, muscle and bone pain, malaise, lymphadenopathy, nausea, vomiting and sore throat. There is loss of appetite with bad taste. Fever may last for 2 – 7 days. A transient skin rash may be present. There may be skin hemorrhages, nasal bleeding, heavy menstrual period or GIT bleeding. A patient is suspected to have dengue fever if there is thrombocytopenia, hemoconcentration and elevated ALT and AST.¹⁶⁻²⁰ For confirmation of dengue fever cases, IgM antibody test is performed after 7 days of onset of symptoms.² A small percentage of patients with secondary infection may show no detectable IgM antibody.²¹⁻²² Dengue fever has no specific treatment and is usually self limiting. Symptomatic treatment should be provided with avoidance of aspirin, NSAID and antibiotics. Patients should remain under the cover of nets through out period of infectivity. They should be well hydrated. Intravenous fluids should be given who have severe vomiting or can not maintain oral intake. Platelet

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infusions are required when platelets fall below 20,000/cmm.⁹

Subjects and Methods

This descriptive case series study was conducted at National Institute of Child Health (NICH), Karachi from September 2006 till November 2006. Children reported with acute febrile illness of 2 – 7 days duration with 2 or more of clinical features according

to WHO criteria as shown in table I were included in the study. Children of known hematological disorder, malignancy, acutely managed for fever and shock were excluded. Total of 152 patients suspected of dengue fever were tested for CBC, PT/aPTT, Blood C/S, Serum proteins, Chest X – Ray, Dengue IgM antibody (tested after at least one week of clinical presentation). The demographic, epidemiological data clinical features, management and outcome were recorded.

Table- 1 WHO criteria for diagnosis of Dengue fever, Dengue hemorrhagic fever, Dengue shock syndrome, probable Dengue Fever (DF)

Acute febrile illness with at least 2 following manifestations.

- 1- Headache
- 2- Retro-orbital pain
- 3- Myalgia
- 4- Arthralgia
- 5- Rash
- 6- Hemorrhagic manifestation
- 7- Leucopenia and supportive serology or occurrence at the same location and time as other confirmed cases.

Confirmed DF: isolation of dengue virus, 4- fold or greater change in antibody titres, demonstration of the dengue virus antigen or genomic sequence

Dengue Hemorrhagic Fever (DHF):

All of the following should be present.

- 1- Confirmed dengue fever through laboratory
- 2- Fever for 2 – 7 days
- 3- Bleeding evidenced by at least one of the following
 - a) Positive tourniquet test (TT)
 - b) Petechiae, ecchymosis or purpura
 - c) Bleeding from mucosa, GIT, injection sites or other
 - d) Haemetemesis or melena
 - e) Thrombocytopenia
- 4- Evidence of plasma leakage due to increased vascular permeability manifested by at least one of the following.
 - a) Rise in hematocrit $\geq 20\%$ above average for age, sex, population
 - b) Drop in hematocrit following volume replacement treatment $\geq 20\%$
 - c) Signs of plasma leakage e.g pleural Effusion, ascites, hypoproteinemia

Dengue Shock Syndrome (DSS)

- 1- Four criteria of DHF plus
- 2- Signs of circulatory failure manifested as
 - a) Rapid and weak pulse
 - b) Narrow pulse pressure
 - c) Hypotension for age (Systolic pressure < 80mmHg for < 5 years, < 90mmHg for > 5 years)
 - d) Cold clammy skin
 - e) Restlessness

Results

During the study period from September 2006 to November 2006, total of 152 suspected patients of dengue infection were admitted in NICH Karachi. After investigations 111 (73%) of these patients were

diagnosed as dengue positive cases on the basis of IgM antibody performed after at least one week of appearance of clinical manifestations. Among dengue positive cases (n=111) males were 53(47.74%) while females were 58(52.25%). Age distribution of these 111 patients is shown in Fig 1.

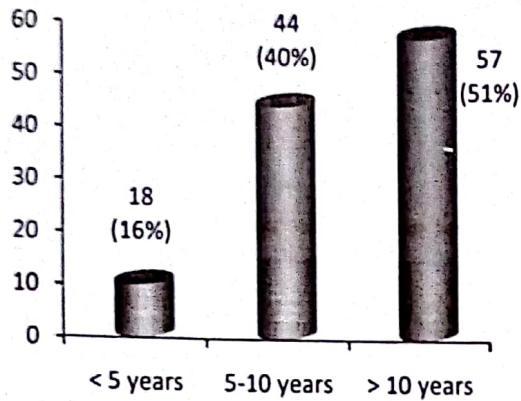


Figure - 1 Age distribution of dengue positive cases (n=111)

Table 2 shows different residential areas from where these children were reported and common sign and symptoms of these patients is shown in Fig 2.

Among 111 admitted patients of dengue confirmed cases 65 patients (58.55%) were diagnosed as Dengue

Table-2 Area-wise distribution of dengue patients

	Area of residence	No. of patients
1	Malir	42
2	Orangi Town	18
3	Korangi	15
4	Landhi	14
5	Gulistan e Johar	7
6	Nazimabad	4
7	Defence	2
8	Thatta	3
9	Moro	2
10	Umerkot	1
11	Tando Adam	1
12	Baluchistan	2
	Total	111

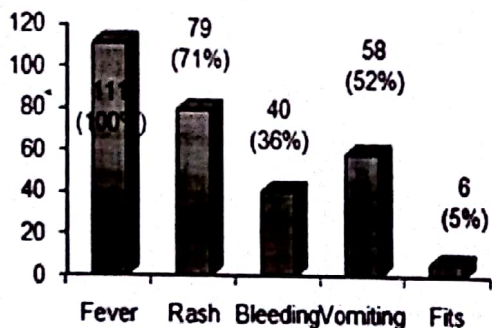


Figure- 2 Common sign and symptoms of dengue cases (n=111)

fever while 40 patients (36.03%) as Dengue Hemorrhagic Fever and 6 (5.40%) as Dengue Shock Syndrome on the basis of WHO criteria as shown in table I.

Treatment provided to patients was symptomatic and supportive. It included paracetamol, ointments and I/V fluids. Platelet concentrates in case of hemorrhage and fresh frozen plasma if PT/aPTT was disturbed. Patients with hemoglobin less than 7gm/dl received red cell concentrate in whole blood transfusion. Three patients (2.7%) died due to prolonged shock. Rests of patients were discharged after clinical improvement. Average duration of stay in hospital was 6 days.

Discussion

Though dengue fever has been recognized as one of the causes of fever for a long period of time in Karachi, but its first major outbreak occurred in 1994-95. In a study conducted in Karachi from 2005-2009 it was revealed that most of dengue fever cases occurred in the months of September through November.² Karachi receives most of its rain in July and August. The stagnant water helps in breeding of vector responsible for most of cases to occur after monsoon rains in Karachi.

During this study period from September to November 2006, total of 152 suspected patients of dengue fever were admitted in NICH, Karachi. Majority of children were brought from Malir, Orangi Town, Korangi and Landhi areas which are periurban slums. These areas have inadequate facilities for solid and waste management. Similar findings were reported in a study conducted in the same year in Civil Hospital Karachi(CHK) and Liaquat National Hospital (LNH), Karachi showing that vast majority of dengue patients belonged to periurban areas of Karachi.²³ Another study conducted in Aga Khan University Hospital (AKUH), Karachi in 2006 reported a different pattern where urban and central parts of Karachi showed higher frequency of cases.²⁴ This could be because AKUH is a private and comparatively expensive hospital where less patients reports from slum areas.

This study observed slight female preponderance among understudy patients. Most of the studies conducted on children reported slight male preponderance of dengue fever.^{8,23} Other studies conducted on adult population mostly observed clear higher frequency of male involvement in dengue fever.^{1,24,25,26} A higher male ratio among adult population could be because adult males works and spend considerable time outside their homes and thus are more vulnerable to mosquito bites. Among children, this habit is less appreciable. Same reason could be the contributing factor in less cases among children under five years of age as they usually have a minimum exposure to outside. Similar findings were reported by other studies.^{27, 28}

The most common symptom in the study group was fever, present in all understudy 152 patients. There are bimodal peaks of fever usually encountered among children.³ Previous studies also reflect fever as the main finding in all dengue epidemics.²³ Rash was another significant clinical presentation present in 71% positive cases of dengue fever. A study conducted in Jinnah Post Graduate Medical Centre in 2007 – 2008 reported rash in more than 81% cases.²⁹ Ahmed et al¹ (2008) in their study conducted in Combined Military Hospital, Malir Cant reported 65% cases of dengue fever presented with rash, Singh et al³⁰ (2005) in their study found 20% patients of dengue infection with rash. Vomiting is another common symptom in dengue fever. Vomiting was present in 52.25% understudy cases. Ahmed, et al¹ (2008) reported 47%, Ahmed, et al²³ (2008) 68%, Abbasi, et al²⁹ (2009) 78.57% whereas Singh et al³⁰ (2005) reported 50.8% cases of dengue with vomiting. Our study showed a higher occurrence of DHF which was 36.03% compared with study conducted in AKUH which showed 29.49% cases of DHF but it is much lower than combined study of CHK and LNH which was 62% cases. The overall mortality in our sample of proven dengue fever was 2.7%. Studies conducted in epidemic of 2006 in Civil Hospital Karachi reported 3% and study at AKUH Karachi conducted in same year showed 2% mortality due to dengue infection.^{23,24}

Conclusion

The frequency of dengue fever confirmed by specific IgM antibody among suspected dengue cases was 73%. Majority of cases reported from periurban slums after monsoon rains. A significant proportion (41.43%) of dengue cases belonged to DHF and DSS.

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