RESEARCH ARTICLE

A RETROSPECTIVE ASSESSMENT OF DENGUE FEVER OUTBREAK IN BANGALORE URBAN DISTRICT, SOUTHERN INDIA

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DOI: 10.5455/ijmsph.2014.280420141 Received Date: 16.04.2014 Accepted Date: 28.04.2014

ABSTRACT
Background: There is an increase in dengue fever outbreaks since the past few decades. The reasons which could be partially attributed to this includes rapid urbanization, climate change and population growth.
Aims & Objective: To assess clinical profile of cases, interventions made and associated environmental factors.
Materials and Methods: A retrospective assessment of fever outbreak was done by a cross sectional house to house survey. Information regarding presentation of fever cases, interventions made and associated environmental factors were studied using interview method, after taking informed consent from all fever cases or their care takers during the outbreak.
Results: Age group commonly affected was of 15 to 44 years. Most common symptom was fever 65 (95.6%), followed by headache and muscle pain. There were 46 (67.6%) cases of dengue fever, 10 (14.7%) confirmed cases of enteric fever and 2 (2.9%) deaths observed among the fever cases. Though there were potential larval breeding places found, none of them had larvae. Most of the households were procuring filtered water for drinking.
Conclusion: There was outbreak of dengue fever as well as enteric fever with many environmental factors contributing to it. Repeated awareness campaigns among public and a well-equipped health care system with efficient surveillance system can avoid such outbreaks in future.
Key Words: Outbreak; Dengue Fever; Urbanization

Introduction

In developing countries like India outbreaks of fever are regularly reported. Now-a-days along with Malaria and Typhoid fevers, emerging and re-emerging diseases like Dengue, Chickungunya and Leptospiral infections have become important causes of fever outbreaks.[1]

Dengue is emerging as a major public health problem in India, caused by dengue virus that belongs to the genus Flavivirus and is principally transmitted by Aedes Aegypti mosquito. Since the first epidemic in Kolkata during 1963-64 many places in India have been experiencing dengue outbreaks. Karnataka is one among the 30 states/Union Territories reporting dengue fever cases with 2285 cases and 7 deaths during the year 2010.[2]

There is increase in dengue fever outbreaks since the past few decades. The reasons which could partially be attributed to this includes rapid urbanization, climate change and population growth.[3] The present study is based on retrospective assessment of profile of dengue fever outbreak which claimed three lives and left around hundred and twenty five infected.

Materials and Methods

Bangalore Urban District in Karnataka State has five taluks viz, South, North, East, North additional and Anekal. Rampura is a village in East taluk of Bangalore Urban District. It's around 20 km from Bangalore city, has a population of around 2220 with 582 households. Majority of people depend on farming for their livelihood. They chiefly grow vegetables and supply it to the Bangalore city. The village comes under Doddagubbi subcentre and Kadusonnappanahalli Primary Health Centre area.

In mid-November 2013 there was unusual rise of fever cases reported, by mid Feb 2014 there were around 125 fever cases reported with three deaths. Most of the fever cases had signs and symptoms of dengue fever. The fever outbreak was declared as dengue outbreak by the District health authorities and confirmed through laboratory confirmatory tests (Using Standardized dengue Enzyme-linked immunoadsorbent assay for immunoglobulin M). Environmental investigations were done through surveys and many houses had larval breeding places. Four water samples out of six samples collected were non potable. Necessary environmental interventions were under taken. An emergency temporary clinic was set with doctors and laboratory

facilities with the help of local health authorities. All fever cases were examined, investigated and treated. Seriously ill patients were referred to the higher centres. With these interventions the epidemic had started declining.

As per the official requisition received from Bangalore Urban District Health Office dated 18/02/2014, to undertake retrospective assessment of fever outbreak and its interventions and to give expert report, we a team of community health professionals with a physician and a paediatrician from Bangalore Medical College and Research Institute visited the village.

Our team, at Rampura, first interacted with the Primary Health Centre Medical Officer and his team who were in the clinic which was established at the outbreak site. The data in the outpatient register were reviewed. The physician and paediatrician examined the clinical cases and their presentation at the clinic.

The Case Definition used for dengue cases was: An acute febrile illness of 2-7 days duration with,

- *2 or more of the following:* (i) headache; (ii) retro-orbital pain; (iii) myalgia; (iv) arthralgia; (v) rash; (vi) haemorrhagic manifestations; (vii) leucopoenia
- *And with 1 or more of the following:* (i) Supportive serology (Positive IgM antibody test in late acute Or convalescent-phase serum specimen). (ii) Epidemiologically linked with a confirmed case of dengue fever (Occurrence at same location and time as other confirmed cases of Dengue fever).

To verify the profile of outbreak, its outcomes and interventions, Community health professionals team with local health staff, conducted a cross sectional study by house-to-house survey of the village. Using systematic sampling technique, every third house was visited and data was collected about fever cases in the household since November 2013.Totally 171 households surveyed and the total population covered was 859. All houses which were open and people who were cooperative were included in the study. For every locked house the immediate next house was chosen.

Information regarding various clinical manifestations of fever cases, investigations done, treatment taken and outcome was collected from affected individuals or their caretakers, through interview method using a semi structured questionnaire. Environmental factors like mosquito and fly breeding places, presence of mosquito larvae in and around the houses and source of drinking water in houses were studied. The data was entered in an excel spread sheet and analysed using Epi Data version 6.1.

Results

Presence of an outbreak was confirmed by comparing the frequency of fever cases with the previous year's data, collected from the District Health Authorities at the beginning of the survey as shown in Figure 1.

Considering an expected fever frequency of 1% of the population per month in the general population, the frequency of fever for our sample population of 859 would have been around 34 for 4 months. However, during the study, we found 68 fever cases over 4 months. This is clearly in excess of the expected frequency.

From the Table 1, we can see that persons in the age group of 15 to 44 years were most affected. The Table 2 shows that males were affected more than females in all age groups other than those above 60 years. The most common symptom was fever 65 (95.6%), followed by headache 37 (54.4%) and muscle pain 28 (41.2%).

Based on the epidemiological case definitions, early and mild cases with typical clinical manifestations satisfying relevant criteria were provisionally diagnosed as having dengue 33 (48.5%). There were 13 (19.1%) confirmed cases of dengue (Figure 3). And it was surprising to note that, there were ten confirmed cases of enteric fever 10 (14.7%) among the fever cases (based on relevant blood tests using WIDAL test). There were 2 (2.9%) deaths observed among the fever cases, while 52 (76.5%) recovered and 14 (20.6%) were currently ill (Table 3).

Environmental Factors

Currently, potential breeding sites were found in 156 (91.2%) of households and no larvae were found. Solid wastes from houses, especially in the outskirts of the village, were still thrown indiscriminately. The open drains also contained solid waste from the houses. After the epidemic, most of the families 140 (82.3%) were procuring filtered water for drinking purposes. Some families were found to use boiled water for drinking purposes. Sewage farming was observed at the outskirts of the village. Vegetables and flowers were grown using sewage farming. Water for farming was taken from the contaminated pond near the village.

Table-1: Distribution of cases among different age groups

Age in years	Frequency	Percentage
Less than 5	8	11.8
5 to 14	6	8.8
15 to 44	39	48.9
45 to 60	13	27.6
More than 60	2	2.9
Total	68	100

Table-2: Distribution of cases among males and females in different age groups

Age in years	Males (n)	Females (n)
Less than 5	7.3% (05)	4.4% (03)
5 to 14	5.9% (04)	2.9% (02)
15 to 44	30.9%(21)	26.6%(18)
45 to 60	10.3%(07)	08.7%(06)
More than 60	1.5% (01)	1.5% (01)
Total	55.9% (38)	44.1% (30)

Table-3: Distribution of cases according to outcome of the illness

Outcome	Frequency	Percentage
Cured	52	76.5
Death	2	2.9
Ill	14	20.6
Total	**68**	**100.0**

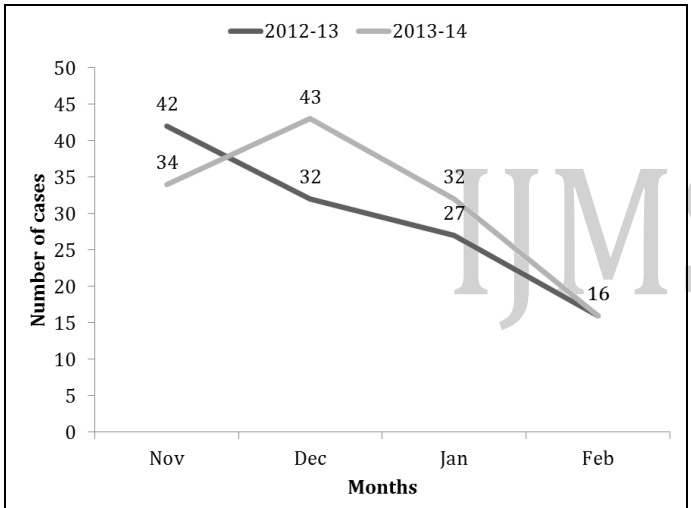

Figure-1: Fever trends of present outbreak (2013-14) compared to last year's (2012-13) data

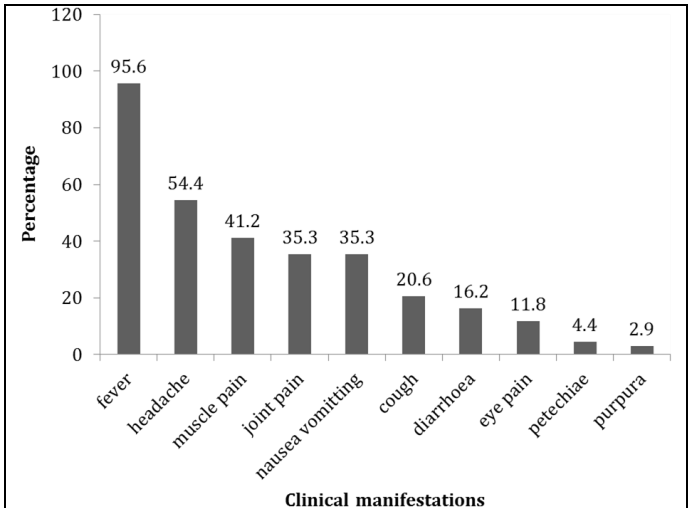

Figure-2: Distribution of clinical manifestations among cases

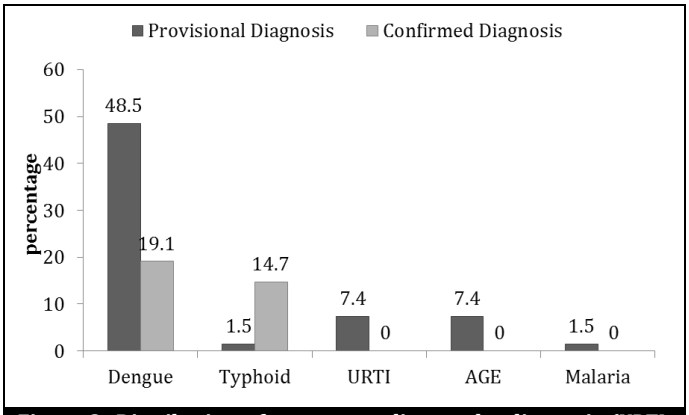

Figure-3: Distribution of cases according to the diagnosis (URTI: Upper respiratory tract infections; AGE: Acute gastro enteritis)

Discussion

A retrospective assessment of dengue fever outbreak involved a cross sectional study using house to house survey. Totally 171 households were surveyed and found 68 cases with history of fever since the beginning of the epidemic. There were 46 (67.6%) cases of dengue fever, of these 13 (19.1%) were confirmed using standard laboratory tests. This data was comparable to the information collected by the District Health Authorities.

It was revealed in our study that the majority of the cases were in the age group of 15-44 years 39 (48.9%). It is reported from various studies in India that young adults suffer maximum from Dengue fever compared to other age groups[5]. In a study by Ashwini kumar et al, largest number of cases (56.4%) occurred in the age group of 15-44 years.[6] It was observed in the study that males were affected more commonly 38 (55.9%) as compared to females 30 (44.1%). It was reported by Prakash Doke in their study that, lesser rate of infections among females could be attributed to dressing pattern in females like wearing sari which prevents mosquito bite.[1] However it is also stated in some studies that lesser rate of infections among females is due to reporting bias among female sex.[1] And some studies also attribute it to lesser number female population compared to males in general population.[6]

The most common symptom was fever 65 (95.6%), followed by headache 37 (54.4%) and muscle pain 28 (41.2%) and only 3 (4.4%) of cases had bleeding manifestations and two deaths (2.9%). Among the two deaths, fever was not found to be the predominant complaint. The patients had complained of sudden onset of very severe fatigue for which they were admitted and were found to be already suffering from complications of Dengue fever. This could be a result of Dengue re-

infection which has a more severe clinical picture than in primary infection. A report from Kerala stated that, during a major outbreak in the year 2003 with 623 cases, case fatality rate was as high as 13.2%.[7]

Currently, potential breeding sites were present in 156 (91.2%) of households but no larvae were found. This could be because of regular larval surveys done on a daily basis by the local health teams. As reported by the local health team, surveys carried out at the beginning of the epidemic showed numerous breeding sites and presence of abundant larvae. At the beginning of the epidemic the House Index (Percentage of houses infested with larvae) was 1.3, Container Index (Percentage of water-holding containers infested with larvae) was 0.62 and Breatue Index (The number of positive containers per 100 houses inspected) was 2.06.[2]

There were 10 (14.7%) confirmed cases of enteric fever among the fever cases. Six water samples sent to State Public Health Institute for testing. Three water samples collected from the taps (outlets) and one from mini tank storage were not suitable for consumption. This may be because of leakage and cross connections in the water pipes which run parallel to the drainage system.

After the epidemic, most of the families 140 (82.3%) were procuring filtered water for drinking purposes. Some families were found to use boiled water for drinking purposes. It was observed at the outskirts of the village, vegetables and flowers were grown using sewage farming. Water for farming was taken from the sewage contaminated pond near the village.

Already the local health staffs had started control measures such as, setting up a clinic in the village for early diagnosis and management, source reduction by emptying breeding sites with larvae. Larvivorous fishes had been introduced in wells and other water bodies. Fogging with insecticide to kill adult mosquito had been done. Awareness had been created among people. With these interventions the epidemic had started declining.

Recommendations

Important issue will be to prevent similar epidemics in the future. Regular surveillance for mosquito breeding places (weekly once) in and around households by local health team like, health worker-male and female, Accredited social health activists (ASHAs) and Angana wadi workers (AWW) followed by emptying and abolishing of breeding places. There are several wells in the village used for farming purposes. These are also potential breeding places for mosquitoes. So, larvivorous fishes to be introduced into these wells and maintained regularly. Solid wastes from houses needs to be collected from house to house collection and disposed in faraway places in a scientific way. The open drains also contained solid waste from the houses. This needs to be taken care of.

As there was outbreak of enteric fever also, there should be vigilante watch about the leakage and cross connections of water supply with immediate rectification. All mini tanks need to be cleaned periodically. Daily water loaded in the mini tanks must be chlorinated after estimating the chlorine demand (2.5 gram of bleaching powder per 1000 litres of water) and supplied after a contact period of 1 hour. Installation of a reverse osmosis plant can be considered for the time being. As a long term measure, it is desirable to divert the city sewage water entering the local pond near the village as the polluted water will seep into the underground water and contaminate well water.

Repeated awareness campaigns among public will help people to avoid mosquito breeding in their houses and encourage using personal protection against mosquito bites. There should be early health care seeking in case of symptoms. Also vigilant and effective surveillance system is the back bone for disease outbreak prevention and control.

Conclusion

We find that two outbreaks have simultaneously occurred in the village where causative agents and transmission dynamics are entirely different. Thus they need different interventions. One is an outbreak of Dengue, a vector borne disease transmitted by Aedes mosquito. This mosquito breeds in artificial collections of clean water. This is a viral disease. The other outbreak is of Typhoid, a disease caused by bacteria (salmonella typhi), transmitted through the faeco-oral route. The source for this disease could be contaminated water supplied in the village or from vegetables grown in the sewage farm in the vicinity of the village.

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Cite this article as: Shobha, Lokanath H, Kumar JP, Rao AK. A retrospective assessment of dengue fever outbreak in Bangalore urban district, Southern India. Int J Med Sci Public Health 2014;3:845-849.
Source of Support: Nil
Conflict of interest: None declared