

## Studies on community knowledge and behavior following a dengue epidemic in Chennai city, Tamil Nadu, India

Ashok Kumar, V., Rajendran, R., Manavalan, R., Tewari, S.C., Arunachalam, N., Ayanar, K., Krishnamoorthi, R. and Tyagi, B.K.\*

Centre for Research in Medical Entomology (ICMR)  
4, Sarojini Street, China Chokikulam, Madurai – 625 002, India

\* Corresponding author e-mail: crmeicmr@icmr.org.in

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**Abstract.** In 2001, a major dengue outbreak was recorded in Chennai city, with 737 cases (90%) out of a total of 861 cases recorded from Tamil Nadu state. A KAP survey was carried out to assess the community knowledge, attitude and practice on dengue fever (DF), following the major dengue outbreak in 2001. A pre-tested, structured questionnaire was used for data collection. The multistage cluster sampling method was employed and 640 households (HHs) were surveyed. Among the total HHs surveyed, 34.5% of HHs were aware of dengue and only 3.3% of HHs knew that virus is the causative agent for DF. Majority of the HHs (86.5%) practiced water storage and only 3% of them stored water more than 5 days. No control measures were followed to avoid mosquito breeding in the water holding containers by majority of HHs (65%). Sixty percent of HHs did not know the biting behaviour of dengue vector mosquitoes. The survey results indicate that the community knowledge was very poor on dengue, its transmission, vector breeding sources, biting behavior and preventive measures. The lack of basic knowledge of the community on dengue epidemiology and vector bionomics would be also a major cause of increasing trend of dengue in this highly populated urban environment. There is an inevitable need to organize health education programmes about dengue disease to increase community knowledge and also to sensitize the community to participate in integrated vector control programme to resolve the dengue problem.

### INTRODUCTION

Dengue is an arboviral disease which includes dengue fever (DF), dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). It is a global problem affecting tens of millions of people in over 102 countries in tropic and subtropics (Monath, 1994). Dengue fever has been identified as a re-emerging disease in Southeast Asia (World Health Organization, 1994). Incidence and geographical distribution of DF have greatly increased in recent years. In India DF has been known since the 19<sup>th</sup> century and epidemics have been reported in all parts of the country (Gubler, 1997). In India, dengue virus was first isolated in 1945

(Sabin, 1952) and the first outbreak of DHF in Calcutta occurred in 1963 (Gupta, 1981) and subsequent of DHF/DSS outbreak was documented in Delhi in 1988 (Kabra *et al.*, 1992).

Dengue fever had been reported regularly in Tamil Nadu state and Chennai city was the major contributor. Out of 816 dengue cases reported from Tamil Nadu state in the year 2001, Chennai city had 90.3% (737 cases) of the disease burden. In the subsequent years, the overall percentage of dengue cases in Chennai city declined to 40–50% since dengue cases spread to other districts of Tamilnadu. Dengue cases have been reported in all months but high numbers of cases were recorded during September to December

(North east monsoon season). The environmental and social changes were closely associated with the emergence of DF and DHF as public health issues in the past years.

Factors involved in the exacerbation of dengue cases are unprecedented and unplanned urbanization, increased mobility, growth in *Aedes* breeding habitats, climate change, lack of effective mosquito control, and deterioration of public health infrastructure (Gubler & Clark, 1995). These factors might have played role in conflagrating scenario in Chennai city also. All the four dengue serotypes (DEN-1, DEN-2, DEN-3 and DEN-4) had been reported in Chennai (World Health Organisation, 1997; Kabilan *et al.*, 2003).

In absence of dengue vaccine, vector control (VC) is the only way to control DF. But even VC is often constrained due to operational bottlenecks in the want of community support. So it is inevitably essential to ensure community involvement in dengue vector control programmes. Before starting any community based VC programmes, it is essential to assess the knowledge and perception of the community about dengue as well as vector control practices. Prevention programmes could be effective only if knowledge as well as vector control practices of people are comprehended and put into main stream of intervention activity (Llyod *et al.*, 1992; Swaddiwudhipong *et al.*, 1992; Leontsini *et al.*, 1993). Therefore a KAP survey was conducted to assess the community knowledge on DF, the practices of vector control and preventive measures implemented to control the DF in Chennai city, following outbreaks in 2001.

#### MATERIAL AND METHODS

Chennai is located at 13.04° N 80.17° E on the southeast coast of India and in the northeast corner of Tamil Nadu state. The lowest temperature recorded was 15.8°C

and highest 44.1°C while the RH ranged between 61-80%. The average annual rainfall is about 1,300 mm. The city gets most of its seasonal rainfall from the north-east monsoon during late September to mid November. The city is a large commercial and industrial centre, and is known for its cultural heritage and temple architecture. The city is administratively divided into 10 zones and each zone is further subdivided into 8-12 divisions.

#### KAP survey

For this survey, multistage cluster sampling method was followed. Of the 10 zones in Chennai, four zones viz., V, VII, VIII and X were selected on the basis of high incidences of dengue cases where most of the divisions were affected (Fig. 1). In each selected zone, all divisions were stratified into two groups, one with high dengue cases and another with no dengue cases based on 2001 dengue data provided by the Health Department of Chennai Corporation. In each group, one division was randomly selected and in each division, 80 households (HHs) were selected and thus a total of 640 HHs were included in the study.

A structured questionnaire which consists of 30 items viz; demographic characteristics of population, knowledge on the causative agent of DF, mode of transmission, mosquito vector behavior (breeding place and biting time), community behaviour on water storage and mosquito control methods was used for data collection. The survey instrument was prepared both in English in vernacular language. In the selected household, mostly head of the family or member aged >18 years old, was interviewed by trained personnel, after getting their consent. The study was approved by the institutional ethical committee as per national guidelines.

Data were analyzed using SPSS version 11. The knowledge level on DF was measured by ranking method. Ten items were selected for this measurement and each item was assigned with score value 1 and 0 for correct and incorrect response

respectively. All the values were summed into total score, which were ranked as high, moderate, low and no knowledge.

## RESULTS

A total of 640 HHs were interviewed and the demographic details are shown in Table 1. Nearly 75% of the respondents belong to educated group while 16.4% respondents were highly educated and 8.8% were illiterate (No school education). Among the total HHs surveyed, 27%, 59% and 14% of respondents belonged to low-income, middle- income and high-income groups respectively. Forty four per cent of the surveyed were housewives and 31% were employed.

### Dengue related Knowledge

Table 2 illustrates that 34.5% of the HHs were aware of dengue fever and only 3.3% of them responded that virus is the causative agent for DF. When respondents were questioned about the mode of transmission, 2/3<sup>rd</sup> of respondents were ignorant. Some of them misunderstood that this disease was transmitted by contaminated water (3.6%), rat infestation (2.5), and man to man contacts (3.9%). Only 18.3% of respondents were aware that dengue was transmitted by mosquito bite. Knowledge on DF and its prevention

was observed to be higher among the formal educated group compared to the uneducated people.

### Vector related knowledge

Out of the 640 HHs, only 8.3% of the HHs informed that clean water-holding containers contributed to vector breeding. Remaining respondents informed other reasons (drainage/sewage water and garbage/bushes) as the main source of breeding for vector mosquitoes. (Table 2).

### Practices of water storage

Table 3 shows the water storage practice in the HHs in Chennai city. Majority (60%) of HHs used small containers (plastic/metal pot) for water storage and 2% of HHs used large containers (Plastic/metal drums & cemented tank/cistern). Nearly 39% of households used both small and large containers for water storage. Only 3% of households expressed that they stored water for more than five days while 13.4% of the HHs stated that they were getting sufficient water through bore well and hence they did not require water to be stored for longer periods.

### Practices on control of dengue mosquito vector

Nearly 65% (417) of households informed that they did not follow any measures towards mosquito breeding. Around 35% of

Table 1. Demographic characteristics of the community surveyed in Chennai city (n=640)

Variables	Respondent	No. HHs surveyed	%
Sex	Male	300	46.9
	Female	340	53.1
Educational Status	Illiterate	56	8.8
	School level education	221	34.5
	High School level education	258	40.3
	College level	105	16.4
Employment	Middle economic group	376	58.8
	High economic group	90	14.1
	Service professionals	201	31.4
	Business / self employed	49	7.7
	House maker	282	44.1
	Students	39	6.1
	Unemployed	69	10.8

Table 2. Community knowledge, behaviour and practices on dengue and its vector breeding in Chennai city

Details	Responses (n=640)	
	No. of HHs	%
1. Community knowledge on dengue		
i) Aware of dengue fever	221	34.5
ii) Virus is the cause for dengue fever	21	3.3
2. Perception on dengue prevention by the community		
i) Can be prevented	161	25.2
ii) Can not be prevented	12	1.9
iii) Not known	467	73.0
3. Methods of dengue prevention suggested by the community		
i) Control mosquito by insecticides	20	3.1
ii) By taking medical care	27	4.2
iii) Keeping environment clean	104	16.3
iv) Taking medical care and keeping clean environment	10	1.6
v) No response	479	74.8
4. Knowledge on dengue vector breeding and biting behavior		
i) Aware of day biting behaviour of mosquitoes	257	40.2
ii) Dengue transmitted by mosquito bite	117	18.3
iii) Dengue mosquitoes breed in clean water	53	8.3
5. Practices on control of mosquito breeding		
i) Followed measures in domestic containers (Covering, cleaning & apply larvicide's)	223	34.8
ii) Followed measures in discarded containers (disposing, burning & sold)	244	38.1
6. Practices on control of mosquito bite during day		
i) Taken measures to avoid mosquito bite in day time (use net or repellents)	64	10.0
ii) Use fan alone	128	20.0
iii) Not taken any measures during day time	448	70.0

Table 3. Community behaviour on water storage in Chennai city (n=640)

Parameter	Type of containers	No. surveyed	%
Type of containers used by the community to store water	Small containers	383	59.8
	Large containers	10	1.6
	Mixed containers	247	38.6
Duration of water storage in domestic water holding containers	1-2 days	457	71.4
	3-5 days	77	12.0
	> 5 days	20	3.1
	No storage	86	13.4

the households stated that they followed some measures (frequently cleaned the containers and covered all containers tightly) to control dengue mosquito breeding. Nearly 31.6% of HHs removed the unused materials, while others informed that they overturned it or sold or burned the unwanted containers (Table 2).

#### **Knowledge on mosquito vector biting time**

A total of 257 (40%) knew that dengue transmitting mosquitoes bite at day-time while 60% of them did not know (Table 2). Irrespective of the knowledge on dengue vector biting, the people were questioned about the personal protection measures

during the day to avoid mosquito bites. Majority of HHs (70%) did not follow any measure to prevent mosquito bites while 20% of households used fan. Only 10% of them followed personal protection measures such as net or repellents.

#### **Perception on dengue fever prevention**

The respondents were asked whether dengue can be preventable. Twenty five percent of HHs expressed that dengue is a preventable disease. Majority of respondents felt that keeping the surrounding clean and following general hygienic conditions will help to prevent the disease. Nearly 16% of them stated that keeping environment clean can help to prevent dengue fever (Table 2).

The overall community knowledge on dengue is mentioned that only 2% of them had good knowledge on dengue fever. Half of the respondents (49.7%) knowledge on dengue was low and around 25% of them having moderate knowledge regarding dengue.

### **DISCUSSION**

Following dengue epidemic in 2001 in Chennai, dengue awareness among the public was found to be 34.5%. While analyzing the data on dengue awareness among different levels of educated groups, it became clear that the degree of knowledge on dengue increased based on level of formal education. The same finding was observed in filariasis study conducted in India (Das *et al.*, 2005). Awareness among the housewives and employed people was only 32% when compared to other groups. In Delhi, DF awareness was 87.3% during 1997 and this increase was attributed to outbreak of DHF in 1996 (Gupta *et al.*, 1998) whereas in Chennai, dengue awareness was comparatively low because the community was not fully sensitized about dengue during the 2001 outbreak.

In Chennai city, due to water scarcity, Metro-water Board made necessary arrangements for water supply on alternate

days to all the HHs. In most of the areas, water was being supplied through lorries. In some areas, larger tanks have been installed at the corner of the street and filled with water periodically. Since the water scarcity is the major problem, people use the water judiciously, by storing them for varying length of period. Because of water shortage during different parts of year people tend to collect water in containers although piped water was available (Strickman *et al.*, 1990). Generally, in all houses, people used to store water for bathing/drinking purposes in large containers viz., metal/plastic drums, cement tank/cisterns etc. A large number of small containers viz., metal / plastic pots were also used to fetch water and for storage when the water supply was inadequate. These water-storing containers became ideal breeding grounds for *Aedes* mosquitoes, if water was stored for longer duration without proper lid to cover the containers. In our study, majority (86%) of HHs practice water storing in the containers and nearly 40% of HHs store water in large containers. Some groups need special attention in future health education programmes, i.e., housewives, unemployed youth and old persons. These people, together with small children, are high-risk groups for dengue conflagration because of their tendency to stay in and around home during daytime (Van Benthem *et al.*, 2002). Normally in a family, women members were more responsible for the household's activities especially in water storage; cleaning of houses and caring of children and more efforts should be focused to educate women members. In Trinidad and Tobago correlation was demonstrated between preventive measures adopted by citizens and their knowledge about dengue (Rosenbaum *et al.*, 1995). The present study reported similar facts that only 18% of community knew that mosquitoes transmit dengue virus whereas more than 35% of community adopt vector control measures (prevention method) in domestic water storage containers and unused containers.

In summary, the majority of population in Chennai city have poor knowledge about dengue disease, its mode of transmission, vector breeding habitat and mosquito biting time. The preventive practices against *Aedes* mosquito breeding in household containers and preventive practices against day biting mosquito were low. The lack of basic knowledge of the community on dengue epidemiology and vector bionomics could be also a major cause of increasing trend of dengue in this highly populated urban environment. There is an inevitable need to organize health education programmes about dengue disease to increase community knowledge and also to sensitize the community to participate in integrated vector control programme to resolve dengue problem.

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