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Short Communication

Dengue in the deserts: Search and Destroy Operations

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ARTICLE INFO

Article history:

Received 9 May 2013

Accepted 1 June 2014

Available online 13 October 2014

Keywords:

Dengue prevention and control

Entomological surveillance

Community based vector control

ABSTRACT

Dengue, a viral disease transmitted by the Aedes mosquito has the potential to cause outbreaks in urban settings. Planned and coordinated actions including entomological surveillance need to be undertaken at the community level, through synergized efforts by all partners and stakeholders.

The experience of conducting such a Task Force based action plan for prevention and control of dengue, in a desert township is highlighted in this study.

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Introduction

Dengue fever is an acute febrile viral disease, characterized by sudden onset, fever for 3–5 days, intense headache, body-aches and other systemic symptoms. The mode of transmission is by the bite of the infective mosquito (Aedes Aegypti) which are fearless daytime biters and breed mostly in artificial accumulations of water.

In the latter part of 2010, based on surveillance being conducted by the Desert Medicine Research Centre (an ICMR institution) it was anticipated that there was potential for an outbreak of dengue in Jodhpur given the conducive weather

conditions. Ambient temperatures ranged between 24 °C and 32 °C and humidity levels fluctuated between 50 and 70% (Relative humidity). The rainfall was unusually high with monthly averages for this district in the deserts, ranging from 109.1 mm in July to 40.3 mm in November (which was a percentage departure from the long term average of 1450%). This unusual and unseasonal rainfall in the desert led to conditions where the Aedes mosquito would have got ample opportunities to breed in an urban setting.

Accordingly the local Station Health Organization (SHO) along with other field Preventive Medicine detachments in the station were tasked to prevent and control the threat posed by dengue. An adhoc 'Task Force' was constituted at the garrison

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<http://dx.doi.org/10.1016/j.mjafi.2014.06.001>

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level for concerted and coordinated action on a fortnightly basis.

Activation of existing Anti Malaria Squads was done at the station level and a concerted campaign of onsite training and motivation was done during the tenure of the 'Task Force'. 'Search and destroy' operations were conducted in and around all buildings including residential accommodation in the garrison. These were done by the squads integral to each unit, under the leadership of field health workers from the central Task Force. They were trained to identify and destroy all potential breeding sites for the vector for example, discarded tins, bottles, broken flower pots, used tyres, desert air coolers etc. All drain traps and valve pits were paid attention to during the weekly 'search and destroy' drives in the garrison. An immediately actionable point was verification of emptying and drying out of all air coolers in the garrison.

Teams from the SHO were dispatched in a planned manner to cover all office buildings in the garrison to spray Temephos for larval control in the air coolers. At the domestic level, individuals were advised to drain out and dry their coolers once a week and wherever feasible, unit squads were tasked to treat air coolers in their area of responsibility with Temephos. It was initially contemplated to advise the community to add one teaspoon of kerosene to the water in the coolers, but this was discarded on grounds of acceptability and difficulty of supervision.

A sustained health education campaign was carried out through school assemblies, colony welfare meetings, roll call assemblies, movie hall slides and mobile announcements, on the need to detect and eliminate *Aedes* mosquito breeding from around human habitation. The community was encouraged to undertake reporting of potential breeding sites such as overhead tanks with leaks, tanks without lids and other such sites wherever water could stagnate or leak. They were also informed that self medication with Aspirin was not to be done indiscriminately for fever etc, as with dengue, dangerous complications could occur.

Organised efforts were undertaken by the Task Force to reduce actual and potential larval habitats around houses and educating the community to undertake covering of all domestic and peri-domestic water receptacles to prevent fresh egg laying by the vector. Attention was also paid to the neglected drip trays behind refrigerators and water coolers. Efforts were made unsuccessfully to introduce larvivoracious fishes in ornamental water tanks (due to the scarcity of these fishes in the region and their reported poor survival in the desert as anecdotally informed by the city anti malaria workers). Hence such tanks were simply drained out and dried.

Doctors and nursing staff were advised on maintaining a high index of suspicion for dengue when dealing with febrile patients. Nursing of all fever cases under insecticide treated mosquito nets was recommended to be done in the wards. Dengue serology and the NS1 antigen were tested for in all cases suspected to be dengue.

Leaders were directed to ensure the implementation and enforcement of routine anti mosquito protective measures in vogue in the military, and to use education as a tool to encourage personal protection. A check list based approach to implementation of control measures was instituted for sub unit leader involvement and accountability.

An effort was made to influence the administrative authorities to issue instructions on the lines of the Model Health Bye Laws of the National Vector Borne Disease Control Program (NVBDCP) however, due to various constraints (mostly due to issues of command and control channels) it was not incorporated into the prevention and control response.¹

Community based vector survey tools

Entomological surveillance was undertaken by the Task Force, through a community based survey, repeated in selected foci.

House index (HI)

A quick survey of systematically selected houses in various sectors of the garrison was done by the Task Force to ascertain the number of houses where *Aedes* larvae were found in water containers. The percentage of houses which were positive for *Aedes* larvae would give an indicator of the risk of transmission, as >5% HI is indicative of a risk of transmission happening in the area. In our experience out of a total of 650 houses surveyed, 35 were found to have *Aedes* breeding in and around them giving a house index of 5.38%.

Container index (CI)

During the vector survey the number of containers or receptacles infected with larvae or pupae (as a percentage) was noted to give us a CI of 4.16%.

Breteau index (BI)

This is the number of containers searched for and found positive for *Aedes* larvae breeding in the houses as above. An index of more than 20 is indicative of a risk of transmission, while index below 5 indicates low risk of transmission. Our experience revealed a BI of 8.

These community based vector survey tools thus indicated a risk of transmission of dengue in the garrison. At the end of the season, there was only one confirmed case of dengue in the military garrison, and on investigation this was found to be an 'imported case' as the individual had just returned from a visit to Delhi where dengue was rampant in that season (Nov).

Discussion

The 1996 Dengue Epidemic in Delhi witnessed an unprecedented number of cases of dengue/dengue hemorrhagic fever from August to November 1996 with many deaths (the military was affected too). Hence medical planners and military public health practitioners have since been wary of such epidemics catching them unawares.

Aedes mosquitoes rarely fly more than 100 m from their breeding site and have a peculiar habit of breeding in artificial accumulations of water in and around built up areas, thus posing more of a threat to health in urban settings. The eggs of the *Aedes* mosquito are very hardy, and survive drying for

some period of time, hence it is very important to destroy, and not merely dry the breeding sites.

Entomological surveillance is used for operational purposes to determine changes in geographical distribution of vectors, for monitoring and evaluating control programmes, for obtaining relative measurements of the vector population over time, and for facilitating appropriate and timely decisions regarding interventions. Entomologic indices, allow identification of geographic areas at high risk for dengue transmission. The Pan American Health Organization has described the levels of risk for dengue transmission being low (HI <0.1%), medium (HI 0.1%–5%), and high (HI >5%). However, classical larval indices appear to have limited use in assessing transmission risk and are a poor proxy for measuring adult abundance. Moreover, such traditional house to house larval surveys are labour intensive and are plagued by difficulties of access, particularly in urban settings.²

However, the appropriateness of larval indices has been questioned; and pupal indices exist, to better reflect the risk for transmission. However, their utility for source reduction programs is controversial, and the feasibility of pupal collection in routine *Aedes* surveillance is untested,³ besides being beyond the limited capability of SHOs who mostly lack adequate trained manpower.

Surveillance may serve to identify areas of high-density infestation or periods of mosquito population increase. Feedback at regular intervals in the suitable season (for the vector) is desirable to evaluate and guide community action activities, indicating civic areas that need more attention and activities that need to be reinforced.

An intensive Communication for Behavioural Impact (COMBI) programme that ensures accurate and timely information for the public should be implemented concurrently with vector control activities in order to engage the community in practices that reduce dengue transmission. COMBI for dengue prevention and control needs to be tailored to the various populations at risk and delivered in a culturally

appropriate way. This must be in a language understood by the majority of the troops and their families, to ensure uptake and sustainability. Primary prevention is thus the most effective measure in dengue prevention and control since no vaccine is currently available.⁴

Successful dengue control programmes have integrated vector control with public health education and community involvement in risk reduction activities. Public education must also continue to reinforce the importance of people seeking medical attention if they have dengue symptoms.

The dengue Task Force experience narrated herein was successful in achieving its purpose and illustrates the role of extensive community involvement and participation and the spirit of synergy that can be exploited through teamwork.

Conflicts of interest

All authors have none to declare.

REFERENCES

1. Ministry of Health & Family Welfare. *Guidelines for Integrated Vector Management for Control of Dengue/Dengue Haemorrhagic Fever*. Govt of India; 2009. <http://nvbdcp.gov.in/>. Accessed on 08.05.13.
2. World Health Organization. *Strengthening Implementation of the Global Strategy for Dengue Fever/Dengue Haemorrhagic Fever Prevention and Control. Report of the Informal Consultation (WHO/CDS/(DEN)/IC/2000.1)*. Geneva: WHO HQ; 2000:1–11.
3. Sanchez L, Vanlerberghe V, Alfonso L, et al. *Aedes Aegypti* larval indices and risk for dengue epidemics. *Emerg Infect Dis*. May 2006;12(5):800–806. www.cdc.gov/eid. Accessed on 08.05.13.
4. World Health Organization. *Dengue: Guidelines for Diagnosis, Treatment, Prevention and Control (WHO/HTM/NTD/DEN/2009.1)*. Geneva: WHO HQ; 2009:111–128.