

## Original Research Article

# A study to assess the impact of health education on larval indices in the rural areas of Ballari: a southern district of India

Suresh Chagnur Marthandappa, Bharat Padmashali, Sameena Abdul Razak Bekinalkar, Bellara Raghavendra\*

Department of Community Medicine, Vijayanagara Institute of Medical Sciences, Ballari, Karnataka, India

**Received:** 28 April 2020

**Accepted:** 11 May 2020

### \*Correspondence:

Dr. Bellara Raghavendra,

E-mail: [bellararaghu@gmail.com](mailto:bellararaghu@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background:** Awareness regarding dengue through health education is one of the important components of Integrated vector control which can bring about reduction in mosquito density and thereby reduction in morbidity and mortality. The objectives of this study to assess the impact of health education on larval indices in the study area.

**Methods:** This was a community based interventional study was conducted between August to September 2017 at rural field practice area of Vijayanagar Institute of Medical Sciences, Ballari. Three villages with a population of more than 2000 were selected randomly. A total of 100 households were surveyed for Aedes larvae in all the three villages. Baseline information and larval indices like house index (HI), container index (CI) and Breteau index (BI) were calculated as per the procedure of WHO. Health education regarding potential breeding sites of Aedes mosquito and importance and methods of eliminating them through demonstration at household level and street play at community level was done. Post intervention larval survey was done.

**Results:** There was 31.7% reduction in container index (pre-CI: 14.2% to post-CI: 9.7%) and 40.1% reduction in Breteau index (pre-BI: 76.3 to post-BI: 45.7%) and this reduction in the larval indices was found to be statistically significant.

**Conclusions:** Based on the high larval indices, the study areas were prone for dengue transmission. There was significant reduction in the larval indices after the educational intervention.

**Keywords:** Larval indices, Aedes mosquito, Health education, Rural areas

## INTRODUCTION

Dengue is characterized by fever, headache, muscle/joint pains, rash, and nausea and vomiting. It has different forms like dengue fever (DF) and its potentially fatal forms - dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS), which is significant public health problem in tropical and sub-tropical regions worldwide.<sup>1</sup> Globally there is 30 folds increases in the incidence of dengue over the past five decades.<sup>2</sup>

Environment is an important determinant of health and plays major role in distribution of diseases as well. Dengue is one of such vectors borne disease where environment plays major role in its endemicity.<sup>3</sup> The most important vector for dengue virus transmission is *Aedes aegypti* mosquito, the reason for its endemicity being the increase in mosquito density, which can be attributed to high density of population, urbanization, developmental activities and improper waste disposal. These factors along with the heavy monsoons and hot humid weather will be ideal for mosquitoes to breed.<sup>3</sup>

To manage the disease, the national vector borne diseases control programme (NVBDCP) of India aims to prevent and control six vector borne diseases, i.e. malaria, dengue, chikungunya, Japanese encephalitis (JE), kala-azar (leishmaniasis) and lymphatic filariasis.<sup>2</sup> The general strategy of the NVBDCP is a comprehensive approach with integrated vector management and surveillance, disease management and supportive interventions such as behaviour change communication (BCC). Awareness regarding dengue through health education is one of the important components of integrated vector control which can bring about reduction in mosquito density and thereby reduction in morbidity and mortality.

Hence an interventional study was done to study the impact of health education on larval indices in rural areas attached to the field practice area of Department of Community Medicine, VIMS, Ballari, with the following objectives.

## METHODS

### Study design, study setting and study duration

This was a community based interventional study conducted between August to September 2017 in a rural setting of 3 villages attached to rural field practice area of Department of Community Medicine, Vijayanagar Institute of Medical Sciences, Ballari.

### Sampling frame, sampling technique and study unit

A list of all the villages with a population of more than 2000 population was prepared. Out of the listed villages, three villages were selected randomly. Within the villages, unit of study was household. After reaching the centre of the village, an empty bottle was swirled, in the direction of the pointing bottle, a total of 100 households were surveyed for *Aedes* larvae using standard larval survey format of health and family welfare under the guidance of an entomologist. All the surveyed households

were given unique identification number. Baseline information and larval indices like house index (HI), container index (CI) and Breteau index (BI) were calculated as per the procedure of WHO.<sup>4,5</sup>

### Intervention

At household level all the family members were educated regarding the potential breeding sites of *Aedes* mosquito and importance and methods of eliminating them through demonstration, and asked to clean the positive containers then and there itself and closed them with lids where ever possible. At community level health education regarding dengue, its modes of transmission and methods of prevention and control was given to the public through street play.

### Data variables

Baseline information includes socio-demographic data, pre-intervention larval indices were collected. Post-intervention data related to larval indices were collected after 1 month of intervention. HI is the percentage of houses or premises positive for *Aedes* larvae. CI is the percentage of water-holding containers positive for *Aedes* larvae. BI is the number of positive containers per 100 houses in a specific location. HI >5% and/or a BI >20 locality is dengue sensitive.

### Statistical analysis

Descriptive statistics like percentages was used to describe the data. Appropriate inferential statistics like chi-square/Mc Nemer tests, were used to study the difference in the outcome variables. A p value of less than 0.05 at 95% CI was considered as statistically significant.

## RESULTS

A total of 100 households in each of the selected village were surveyed.

**Table 1: Larval indices among the three villages surveyed.**

Parameter	Sidiginamola		Kolur		Haraginadoni	
	Pre	Post	Pre	Post	Pre	Post
House searched	100	100	100	100	100	100
House positive	25	30	20	11	67	56
House index	25%	30%	20%	11%	67%	56%
Containers searched	493	433	537	489	587	495
Containers positive	46	39	25	16	158	82
Container index	9.33%	9%	4.70%	3.33%	26.90%	16.66%
Houses searched	100	100	100	100	100	100
Container positive	46	39	25	16	158	82
Breteau index	46	39	25	16	158	82

**Table 2: Impact of health education on the larval indices in the study area.**

Parameter	Overall		% reduction	P value*
	Pre	Post		
House searched	300	300		
House positive	119	87		
House index	39.7%	29%	26.9	0.05421
Containers searched	1617	1417		
Containers positive	229	137		
Container index	14.2%	9.7%	31.7	<0.001
Houses searched	300	300		
Container positive	229	137		
Breteau index	76.3	45.7	40.1	<0.001

\*Mc Nemar test.

Baseline larval indices showed that in village Haraginadoni all the larval indices were high (HI: 67%, CI: 26.9%, BI: 158) compared to Sidiginamola (HI: 25%, CI: 9.3%, BI: 46) and Kolor villages (HI: 20%, CI: 4.7%, BI: 25). The container index (CI: 4.7%) and Breteau index (BI: 25) were low in Kolor village compared to other two villages (Table 1).

After household and community level health education, post intervention larval survey indicated that there was considerable improvement in the larval indices in all the places except for Sidiginamola village where the house index increased from 25 to 30%, container index reduced from 9.3 to 9% and Breteau index from 46 to 39 (Table 1).

Overall, a total of 300 households within the three villages were included for the study wherein health education at household level and community level was done through demonstration and street play respectively. After the intervention, it was observed that there was 31.7% reduction in container index (pre-CI: 14.2% to post-CI: 9.7%) and 40.1% reduction in Breteau index (pre-BI: 76.3 to post-BI: 45.7%) and this reduction in the larval indices was found to be statistically significant. There was 26.9% reduction in house index (pre-HI: 39.7% to post-HI: 29%) and this difference was not found to be statistically significant (Table 2).

## DISCUSSION

A community based interventional study was conducted to assess the impact of health education on larval indices in the study area. A total of 300 households within the three villages were enrolled for the study.

In our study the overall HI, CI, BI were 39.7%, 14.2% and 76.3 respectively. This was similar to the study done by Singha et al, which showed HI, CI and BI were 33.90%, 19.38%, and 177.06 respectively. In another study done by Arunachalam et al, the range of HI, CI and BI were 28-40%, 13-37% and 32-60 respectively.<sup>6,7</sup> Since house index was more than 5% and Breteau index is more than 20 per 100 houses in all these study areas, these

areas are prone of dengue transmission. In our study, high entomological indices above the critical level due to be the compulsion of storing water in different containers to meet the acute shortage of water and most of the people may not be aware of the factors exacerbating mosquitoes breeding conditions.

Our study also shows that there is 26.9% reduction in HI, 31.7% reduction in CI (p<0.05) and 40.1% reduction in BI (p<0.05) following the intervention, similarly the study done by Espinoza et al, shows that the reduction was more apparent in the houses that received educational campaign compared to without education, another study by Healy et al, shows similar results, in their study using active education, they observed 22.6% reduction in container habitats in the communities being educated (treatment site), compared to a 32.3% increase in the sites not receiving education (control sites).<sup>8,9</sup> Similar educational community model was tested in a study done in Mexico, showed that significant changes in knowledge and behaviour were seen in the treatment group in both post-tests (two tests), also women in the intervention group were able to identify the *Aedes aegypti* mosquito, larval production sites of the mosquito, and appropriate control methods.<sup>10</sup>

The goal of the study was to assess the use of public health educational campaign on the source reduction behaviour of the community. However some of the studies have shown that educational campaigns can be most effective only when there community participation in the program.<sup>11</sup> Which was very demonstrated in the study done by Healy et al where they evaluated the use of community peer educators in promoting reduction of mosquito habitats for mosquitoes, specially *Aedes albopictus*.<sup>9</sup>

Studies have shown that community-based programs have not only been effective in reducing container habitats, but also in reducing house, container, and Breteau indices and there is added benefit of increasing the knowledge of the members of the community in recognition of habitats, transmission of disease, and personal protection.<sup>10,12</sup> Although programs that focus on behaviour changes

through public messages are often short term, future community based programs must promote the public to be self-sufficient.<sup>13,14</sup> Therefore, every effort should be made to involve the community when developing source reduction campaigns.<sup>11,14</sup>

## CONCLUSION

High entomological indices in the study areas showed that these areas are prone of dengue transmission. After the targeted public health educational intervention there was a significant reduction in the larval indices thereby reflecting and reinforcing that health education plays an important adjuvant role in prevention of dengue transmission.

## ACKNOWLEDGEMENTS

Authors sincerely thank the Institution, the Principal and Professor and Head of the Department of Community Medicine, medical students for their cooperation in carrying out the study. Authors also thank the teaching staff and my colleagues for their valuable guidance. The authors are also grateful to authors/editors/publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee of VIMS, Ballari*

## REFERENCES

1. Khun S, Manderson L. Community and school-based health education for dengue control in rural Cambodia: a process evaluation. *PLoS Neglected Tropical Diseases*. 2007;1(3):143.
2. Kusuma YS, Burman D, Kumari R, Lamkang AS, Babu BV. Impact of health education-based intervention on community's awareness of dengue and its prevention in Delhi, India. *Global Health Promotion*. 2019;26(1):50-9.
3. Chakravarti A, Arora R, Luxemburger C. Fifty years of dengue in India. *Transactions Royal Society Tropical Med Hygiene*. 2012;106(5):273-82.
4. World Health Organisation. Prevention and control of dengue and dengue haemorrhagic fever: comprehensive guidelines. WHO Regional Publications SEARO; 1999: 29.
5. World Health Organisation. Dengue guidelines for diagnosis, treatment, prevention and control, WHO. Regional Publications SEARO; 2009.
6. Singh RK, Dasa MK, Dhiman RC, Mittal PK, Sinha ATS. Preliminary investigation of dengue vectors in Ranchi, India. *J Vector Borne Dis*. 2008;45:170-3.
7. Arunachalam N, Murty U, Kabilan L, Balasubramanian A, Thenmozhi V, Narahari D, et al. Studies on dengue in rural areas of Kurnool District, Andhra Pradesh, India. *J Am Mosquito Control Association*. 2004;20(1):87-90.
8. Gomez EF, Suarez HCM, Cardenas CR. Educational campaign versus malathion spraying for the control of *Aedes aegypti* in Colima, Mexico. *J Epidemiology Community Health*. 2002;56(2):148-52.
9. Healy K, Hamilton G, Crepeau T, Healy S, Unlu I, Farajollahi A, et al. Integrating the public in mosquito management: active education by community peers can lead to significant reduction in peridomestic container mosquito habitats. *PLoS One*. 2014;9(9):108504.
10. Lloyd LS, Winch P, Canto OJ, Kendall C. Results of a community-based *Aedes aegypti* control program in Merida, Yucatan, Mexico. *Am J Tropical Med Hygiene*. 1992;46(6):635-42.
11. Gubler DJ, Clark G. Community involvement in the control of *Aedes aegypti*. *Acta Tropica*. 1996;61:169-79.
12. Leonstini E, Gil E, Kendall C, Clark G. Effect of a community-based *Aedes aegypti* control programme on mosquito larval production sites in El Progreso, Honduras. *Transactions Royal Society Tropical Med Hygiene*. 1993;87:267-71.
13. Brieger WR. Health education to promote community involvement in the control of tropical diseases. *Acta Tropica*. 1996;61:93-106.
14. Perez D, Lefevre P, Sanchez L, Sanchez LM, Boelaert M. Community participation in *Aedes aegypti* control: a sociological perspective on five years of research in the health area '26 de Julio', Havana, Cuba. *Tropical Med Int Health*. 2007;12(5):664-72.

**Cite this article as:** Marthandappa SC, Padmashali B, Bekinalkar SAR, Raghavendra B. A study to assess the impact of health education on larval indices in the rural areas of Ballari: a southern district of India. *Int J Community Med Public Health* 2020;7:2131-4.