

## Research Article

# The Role of Health Education on Larval Indices and Fever Cases from Rural Area of Thrissure District, Kerala: A Quasi Randomized Control Study.

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## Abstract:

**Background:** Vector-borne diseases pose a devastating obstacle to human health and overall economic development. It is responsible for 17% of all infectious diseases and more than 700000 deaths annually. Among vector borne diseases Dengue fever is the most rapidly spreading with an incidence, increased 30 fold in the past 50 years. Awareness regarding dengue and its control measures through health education is one of an important component of integrated vector management. It can bring down larval indices and thereby reduce the mosquito density, and bring down the morbidity and mortality caused by mosquito borne diseases. Hence an intervention study was undertaken to study the impact of health education on larval indices and fever cases in a rural field practice area of Thrissur district Kerala.

**Methodology:** A quasi randomized control study was conducted from, January 2019- March 2020 in ward 13 of Thrikkur Panchayath, Thrissur district. Total 960 households were surveyed for indoor and outdoor water holding containers and inspected for the presence of mosquito larvae. The larval indices like House Index (HI), Container Index (CI) and Breteau Index (BI) were calculated as per the procedure of WHO. The total number of fever cases were collected from these households by an interview schedule. Adult mosquitoes were also collected from the premises. Health education and demonstration classes on potential breeding sites of Aedes mosquito and methods of eliminating at household and community level were undertaken. Post intervention larval survey was also done.

**Results:** Baseline larval indices showed that all the indices i.e HI : 13.09%, CI: 5.38% and BI: 15.4% were high in the month of June and another peak of larval indices were seen in the month of November 2019 (HI:10%, CI : 7.3%, and BI :10%) Total number of self-reported fever cases were also high during the month of June (208) and July(195). The post intervention larval indices showed a considerable reduction in Breteau index from 10% to 7.5% in the month of November 2019 and in the month of February before intervention the BI was 10% and after intervention in Feb 2020 BI came to 2.5% .

**Conclusion:** There was a significant reduction in larval indices after an educational intervention.

**Keywords:** larval indices, health education, Fever cases, mosquito borne diseases.

## Introduction

Vectors are living organisms that can transmit infectious pathogens from animal to human or between humans. Many of these vectors are blood-sucking insects, from an infected host they ingest the disease causing microorganism through blood meal and later transmit it to other host after the replication of pathogen.(1) Vector-borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by hematophagous arthropods, including mosquitoes, ticks,

sand flies, and triatomine bugs. Malaria, dengue, chikungunya, schistosomiasis, human African trypanosomiasis, zika, leishmaniasis, Chagas disease, yellow fever , Japanese encephalitis and onchocerciasis are some of the major vector borne diseases. Globally, It contribute to one sixth of the illness and morbidity, with more than half the world's population currently estimated to be at risk of these disease . According to WHO It is responsible for 17% of all infectious

diseases and more than 7,00,000 deaths annually.(2) Among this, mosquito borne diseases are most prevalent and debilitating disease in tropical and sub-tropical region.(3) We can assess the mosquito density by conducting periodic entomological surveillance. The larval indices was one of the most commonly used standardized entomological surveillance which can be done easily and quickly in the field. The larval indices are used to predict the outbreak of mosquito borne diseases and notify the community to take preventive measures. The most commonly used indices are the House (or 'premise') index (HI - percentage of houses infested with larvae and/or pupae;) the Container index (CI - percentage of water-holding containers infested with larvae and/or pupae) and the Breteau index (BI - number of positive containers per 100 houses inspected) A HI greater than 10% and BI more than 5% is considered as critical levels beyond which epidemics are likely to occur and previous surveys in the state shows an outbreak is always anticipated. If the BI is above 50%, the area is categorised as a very high-risk area and between 5-50% is considered as moderate risk.(4,5) A high CI suggests the need for man-made source reduction

Vector control is the principal method available for controlling vector borne diseases, We can limit the transmission by eliminating human contact with the vectors. There are many vector control tools exist, broadly classified into chemical- and non-chemical-based tools. Tools targeting immature vectors like chemical or biological larvicides and predator species, tools targeting the adult vectors like indoor residual spraying [IRS], space spraying, topical repellents, house screening, insecticide-treated bed nets [ITNs], insecticide-treated dog collars. Tools under development are genetic manipulation of mosquitoes, insecticide-treated eave tubes.(6) Integrated vector management (IVM) is a method for tackling infectious diseases by vector control, in which health education is the key element at all levels, it help households to understand and take control of their domestic environments with regard to vector-borne diseases. Defensible participation is possible only if community is educated on the vector aspect of mosquitoes and control of mosquitoes through using available method which were environmentally sound, economically feasible and socially acceptable.(7) . Hence an intervention study was undertaken to study the impact of health education on larval indices and fever cases in a rural field practice area of Thrissur district Kerala

## Materials and Method

A Quasi experimental study was conducted at ward 13 of Thrikkur Panchayath which belongs to the field practice area of our Rural Health Training Centre. Around 960 households were included in the study. The study was conducted during January 2019 to August 2020. There were 17 wards in Thrikkur Panchayath out of one ward (ward13) was randomly selected for the study. There were 976 households in ward 13. A house to house survey was done by a team consisting of five under graduate students, one postgraduate student, one medico social worker, one health inspector and a entomologist. We

covered 976 houses in period (Jan 2019- March 2020). Houses which were locked even after 3 consecutive visit were excluded, Monthly 75- 80 household were covered consecutively.

## Intervention:

Two interventions in the form of health education was given to the house hold members of ward 13 in two different places on November 2019 and December 2019. Before intervention baseline larval survey was conducted and after intervention same area was resurveyed on November 2019 and December 2019. A resurvey was conducted on Feb 2020 and march 2020 to know the long term effect of health education and the vector indices were compared before and after intervention.

## Operational definition:

$$\text{House index (HI)} = \frac{\text{No. of positive houses infested}}{\text{Total no. of houses inspected}} \times 100$$

$$\text{Container index (CI)} = \frac{\text{No. of positive containers infested}}{\text{Total no. of containers inspected}} \times 100$$

$$\text{Breteau index (BI)} = \frac{\text{No. of positive containers}}{\text{Total no. of houses inspected}} \times 100$$

## Data collection:

A structured questionnaire was used for data collection. The study tools included a survey form, pipettes, plastic bottles, plastic bags, a specimen test tube with stoppers, pens, a label and a flashlight .After obtaining consent from the house owners, the premises of each house were searched thoroughly both indoor and outdoor and from each positive container, the larva was pipette into a plastic cup/ plastic bag and were brought to the laboratory for identification. The type of positive containers, larval presence was entered on a pretested proforma. The larval indices like house index(HI) and Breteau index(BI) Container index(CI) were calculated as the procedure of WHO. An interview was done with females in the household and collected the self-reported fever cases.

## Data analysis:

data was entered in Microsoft excel and SPSS ver.23 was used for analysis. The appropriate statistical methods like proportion, percentage and Wilcoxon sign rank test were used in this study.

## Results:

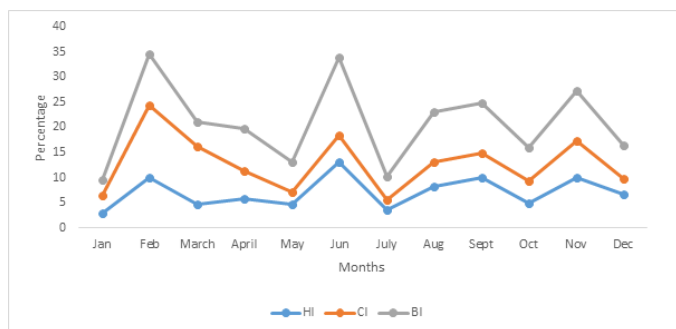
Baseline larval indices showed that all the indices i.e HI : 13.09%, CI: 5.38% and BI: 15.4% were high in the month of June and another peak of larval indices were seen in the month of November 2019 (HI:10%, CI : 7.3%, and BI :10%) Total number of self-reported fever cases were also high during the month of June (208) and July(195). Fig : 1 & Fig: 2.

The most common wet container were plastic container coconut shell , Rubber tyre egg shell, flower pot, flower pot earthen pot, barrel tarpaulin sheet The most common dry container identified from the vector survey were plastic containers, rubber tyre, coconut shell egg shell, flower pot

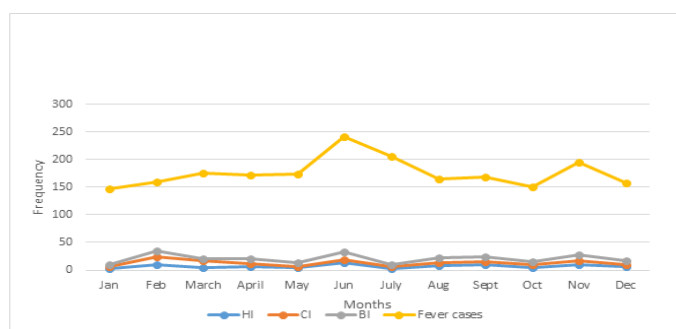
shoes barrel utensils.( Table: 1)

earthen pot, barrel tarpaulin sheet The most common dry container identified from the vector survey were plastic containers, rubber tyre, coconut shell egg shell, flower pot shoes barrel utensils.( Table: 1)

**Fig: 1 Trend of larval indices every month from ( JAN 2019 to DEC 2019)**



**Fig: 2 Correlation between self-reported fever cases and larval indices**



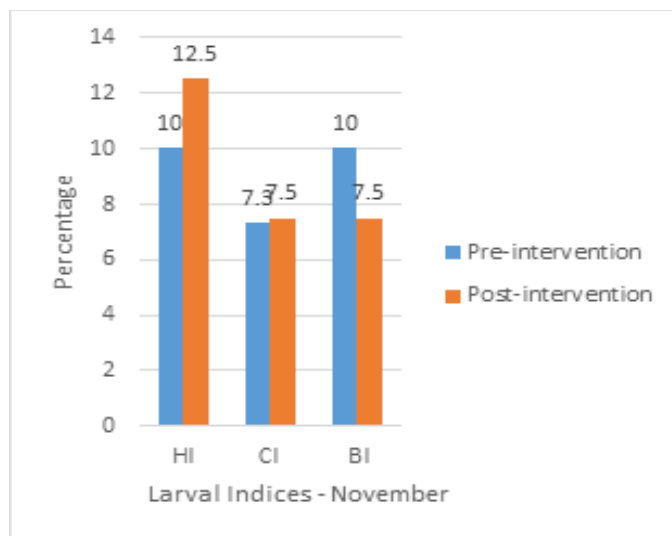
**Table: 1 Total number container and type of containers**

Container	January 2019 to January 2020			
	Wet	Wet (%)	Dry	Dry
Plastic bucket	286	18	245	8.8
other plastics	397	25.2	954	34.4
Rubber tyre	125	7.9	238	8.5
Coconut shell	280	17	722	26
Egg shell	57	3.6	180	6.4
Flower pot	115	7	117	4.2
Earthen pot	53	3.3	96	3.46
Areca nut	9	.57	2	.07
Fridge tray	4	.25	0	0
Tarpaulin sheet	13	.82	16	.57
Tin	7	.44	16	.57
Banana leaf axil	5	.31	2	.07
Grinding stone	2	.12	3	.10
Shoes	113	71.1	39	1.4
Barrel	104	6.6	78	2.8
Utensils	1	.06	61	2.2
Motor	0	0	2	.07
<b>Total</b>	<b>1571</b>	<b>100%</b>	<b>2771</b>	<b>100%</b>

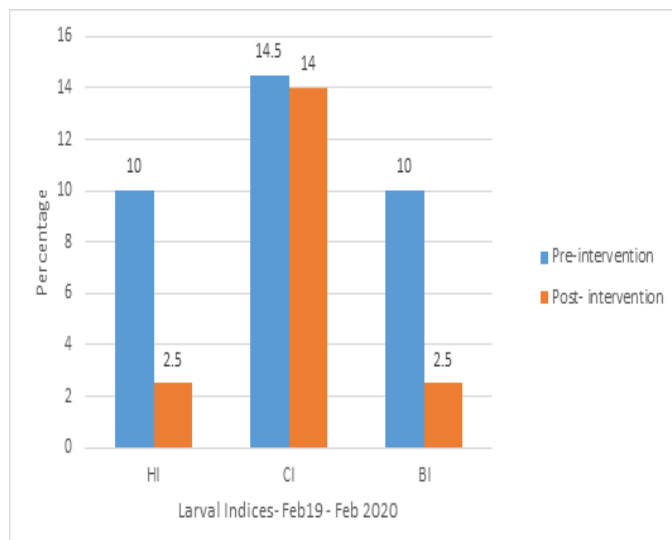
The post intervention larval indices showed a considerable reduction in BI from 10% to 7.5% in the month of November 2019 and in the month of February before intervention the BI was 10% and after intervention in Feb 2020 BI came to 2.5%. Fig:3 & Fig:4. The long term effect of health education was assessed by comparing vector indices on March 2019 and March 2020, and it showed a considerable reduction in HI from 4.7 to 2.2, CI from 11.6 to 4.7 and BI from 4.7 to 2.2.

Fig:5

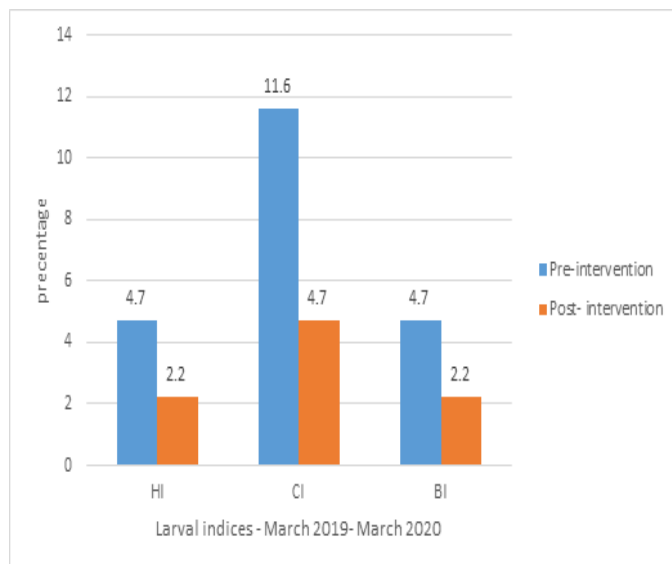
**Fig 3: Impact of Larval Indices before and after health education intervention–November**



**Fig 4: Impact of Larval Indices before and after health education Feb 2019 and Feb 2020**



**Fig 5 : Impact of Larval indices before and after health education – March 2019 and 2020**



**Table:2 Comparison of larval indices before and after health education intervention**

Month	Time	Minimum	Maximum	Median	Interquartile range	P value Wilcoxon sign rank test
November	PRE INTERVENTION	1	16	6.35	2.820	0.0001
	POST INTERVENTION	0	13	2.46	2.695	
December	PRE INTERVENTION	0	18	3.91	3.338	0.0001
	POST INTERVENTION	0	12	1.23	2.069	

There was statistically significant difference between pre post intervention in larval indices in November and December month due to health education. (p value 0.001). Table:2

The most common vector species identified in the present study was *Aedes albopictus*. Vector surveillance through ovitraps is a good and cost effective tool for dengue surveillance. It is reported that ovitrapping is a more efficient tool to detect the presence of *Aedes* as compared to larval survey when the infestation rate was low. (8) In this study, a series of ovitrapping activities was conducted to investigate the abundance and distribution of *Aedes albopictus*. For this black plastic containers of 300 mL volume was used as the ovitrap. Hard-board measuring 10 cm x 2.5 cm x 0.3 cm was used as an oviposition paddle and was placed in the ovitrap container to allow mosquito to lay eggs on its surface. Clean tap water was added to a level of 5.5 cm. The ovitraps were recovered after 5 days of placing in designated areas and brought back to the Medical Entomology Unit for the larvae species identification. Total 5 ovitraps were placed in different sites in ward 13. We collected the eggs from the ovitrap and reared out in the laboratory for identifying the species from larvae, *Aedes albopictus* were identified from each ovitrap.

**Discussion**

In the present study, we surveyed 960 houses and the most common vector breeding sites identified were plastic container, coconut shell, tyres, egg shell, flower pot, earthen pot, barrel tarpaulin sheet. Our study covered both heavy monsoon and post monsoon period. In a study conducted in Trivandrum district in Kerala, the most common water holding containers were also plastic, followed by coconut shells and larval indices were high during the month June HI : (13.09%, CI: 5.38% and BI: 15.4%) and November (HI:10%, CI : 7.3%, and BI :10%), which was similar to our study.(9) The similar result were obtained from another study done in rural area of Thrissur district.(10) Another study done in Thrissur district also showed a peak in larval indices during the month of June. (11) In present study, after intervention in Feb 2020 BI came to 2.5%. Similar finding were noted in a study conducted in Karnataka. 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(12).The present study showed increase in number of fever cases with increase in vector indices. Similar result

was obtained from Tamil nadu, to determine the impact of the entomological surveillance, the HI, CI, and BI was 48.2%, 28.6%, and 48.2% before the entomological intervention, after the intervention these indices were considerably reduced to 10.2%, 5.2%, 2.5%, and 1.6% respectively. These findings reflected the considerable reduction in the population of *Aedes* species and subsequently a reduction in the number of dengue cases reported(13). The present study also showed that the *Aedes albopictus* was the most common species found in the vector survey. It is species which is commonly found in South India.

**Conclusion:**

Significant reduction in the larval indices was observed in intervention village compared with the baseline., Impact of education campaign on vector mosquito control will help to gain support from the community for reducing the vector born disease and also help other elimination programme

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