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Original Research Article

A study of the effectiveness of school health education programs on selected mosquito borne diseases: school based cross-sectional study

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ABSTRACT

Background: School health education programs provide a convenient platform for engaging the students in health promotion activities. Public health problems like mosquito borne diseases cannot be controlled without active participation of the community and students are a resourceful component of the community who can be encouraged to take up activities to control mosquito borne diseases in the community.
Methods: School-based cross-sectional study was conducted in December 2010 to March 2011 among 508 school students selected at random from students studying in the eighth to tenth standard. $P < 0.05$ was considered as statistically significant.
Results: Totally 508 students were included in this study. The number of students unaware of the stages in the mosquito life cycle and the mosquito's resting habits reduced from 420 (82.68%) to 19 (3.74%) and 103 (20.28%) to 13 (2.56%) respectively. The number of students with correct knowledge of the biting habits of the female mosquito and personal protection (PP) measures increased from 31.69% to 97.05% with statistically highly significant ($p <0.0001$) and 52.95% to 74.21% respectively.
Conclusions: The present study suggested that the school health education program is effective in creating awareness and increasing the knowledge regarding mosquito borne diseases among school children and possibilities of successfully engaging the community at large in the fight against mosquito borne diseases. The need would be to sustain this activity and implement it in schools as part of the vector borne disease control programme.

Keywords: Cross sectional study, Mosquito borne Diseases, School going children, School health education program

INTRODUCTION

Vector borne diseases are a significant cause of morbidity and mortality globally. Dengue Fever (DF) and Chikungunya are the systemic viral infections transmitted among humans by infected Aedes mosquitoes.[1] DF ranks as the most important arboviral disease with almost half the world's population now at risk. Outbreaks exert a huge burden on the populations, health related systems and the economics of the most tropical countries in the present world. DF is caused by the infection of flavi virus in tropical and subtropical regions of Asia, Pacific and the Caribbean islands, Central America and South America whereas Chikungunya, caused by an alpha virus is endemic to Africa and Asia.[2,3] Severe and life threatening forms of DF is Dengue hemorrhagic fever

(DHF) and Dengue shock syndrome (DSS). DHF tends to affect children under 15 years of age and DSS causes dangerously low blood pressure.[4,5] Typically, the people infected with dengue virus were asymptomatic DF (80%), some others have DHF (5%), and a small proportion of people have DSS.[6,7] Aedesmosquitoes bite during the daytime, particularly in the early morning and in the evening, and thus spread infection at any time of day throughout the year.[8] An infection can be acquired from a single bite of the Aedes mosquito, which has a limited flight range.

The global incidence of dengue is 390 million per year, of which 96 million manifest apparently.[1] The latest studies estimate and stated that 3.6 billion population were living in areas of risk, more than 230 million people were having the infections, millions cases of DF, over 2 million cases of the severe disease and 21,000 deaths.[9] In 2013, Chikungunya was confirmed on the Caribbean island of St. Martin with 66 confirmed cases and around 181 suspected cases.[9]

In India, more than 32,000 dengue cases and 100 deaths of the month of September 2013 have been reported. The highest incidence of DF was in Kerala, which had 7,000 cases.[10] Early detection of DF suspected cases, access to proper medical care and proper disease management can help in drastically lowering the rate of fatal cases.[11] There are currently no licensed vaccines or specific therapeutics for DF and Chikungunya.[12,13]

At present, various vaccines are used to treat the patients at the preclinical and clinical stages of development of dengue.[14] So, great emphasis is placed on control and preventive measures. Prevention can be achieved by reducing the habitat and the density of mosquitoes and limiting exposure to bites. The objective of the study was to assess the effectiveness of a school health education programs on mosquito borne diseases. To creating awareness about vector borne diseases like dengue and Chikungunya, their control and urging students to adopt better practices in the community and help in the control of mosquito borne diseases (MBDs).

METHODS

Sample selection

Students from 8th to 10th standard from two Government and two private schools were selected and included in our present study. The schools were located in and around the practice area of Anaichikuppam Rural Health Centre, Department of Community Medicine, Pondicherry Institute of Medical Sciences, Puducherry, South India.

Student selection, their training and method of data collection

A questionnaire was designed to assess the level of knowledge about selected MBDs among students and the different factors that influenced the degree of awareness. The study period was December 2010 to March 2011. A total of 508 students were enrolled from four different schools. Data was collected by trained final year medical students, interns and post graduate students under the direct supervision of the author and co-investigators. The questionnaires had five main sections; under each section were various subdivisions to collect different types of data. The subdivisions included demography, economic factors, education, general knowledge and awareness. The pre-test was conducted from 10th to 12th, December 2010, and this was followed by imparting health education. After a period of three months, post-test was conducted from 15th to 17th, March 2011 in the same schools. Health education included 40 minutes of a power point presentation and videos covering the topics listed earlier. Prior permission was obtained from the school authorities before starting the study. Briefed about the nature of the study to the participants and oral consent was obtained from them. Pre-designed and pre-tested structured questionnaire was administered in the present study. Necessary prior permissions were obtained from the school authorities. Data was entered in Microsoft Excel and used to construct the tables. SPSS, version 16.0 was used for statistical analysis.

Statistical analysis

For comparing the Mean and Standard Deviation, proportions, for association chi-square test was used and p- value less than 0.05 was considered as statistically significant.

RESULTS

A total of 508 students studying in 8th to 10th standards (Table 1) participated.

Table 1: Distribution of gender and standard among the school students.

School standard	Gender		Total N (%)
	Boys	Girls	
	n (%)	n (%)	
VIII	85 (36.64)	85 (30.80)	170 (33.47)
IX	79 (34.05)	111(40.22)	190 (37.40)
X	68 (29.31)	80 (28.99)	148 (29.13)
Total	232 (45.67)	276 (54.33)	508 (100.0)

Out 508 students, 232 (45.67%) were boys and 276 (54.33%) girls. The overall mean age of the school students was found as 13.95±1.21 (Mean±SD) years. In the present study, 161 (31.7%) were aware that only the female mosquito bites/feeds on the host, but this number rose to 493 (97.1%) at the end of the programme. In the pre-test, more particularly, the number of students, who did not know about the life stages by 420 (82.9%) and resting habits of mosquitoes by 103 (20.3%), reduced significantly to 19 (3.7%) and 13 (2.6%) respectively

(Table 2). It was observed that 268 (52.8%) and 232 (45.7%) students, knew that DF and Chikungunya were MBDs, the number increased to 371 (73%) and 392 (77.2%), respectively, post-test. In the pre-test 257 (50.6%) students knew that these viral diseases were transmitted 'only by Aedes mosquitoes' and 431 (84.8%) had gained the knowledge as per the post-test. Three fourth (382; 75.2%) of the students were aware about the causes of getting MBDs through 'mosquito bite' and the number increased to 404 (79.5%) after the programme (Table 3).

Table 2: Knowledge of students about mosquito bionomics (N= 508).

Knowledge	Pre test n (%)	Post test n (%)	Chi- square value	p- value
Which mosquito bite/ feed the host?				
Male mosquito	122 (24.01)	9 (1.77)	468.29	<0.001 HS
Female mosquito	161 (31.69)	493 (97.05))		
Both	93 (18.31)	5 (0.98)		
Don't know	132 (25.98)	3 (0.59)		
Biting time of Aedes mosquito*				
Morning	50 (9.84)	18 (3.54)	596.85	<0.001 HS
Night	246 (48.42)	93 (18.31)		
Evening	73 (14.37)	20 (3.94)		
Day time	11 (2.17)	430 (84.65)		
All time	37 (7.28)	46 (9.06)		
Don't know	111 (21.85)	9 (1.77)		
Breeding places of mosquitoes*				
Rice field	51 (10.04)	36 (7.09)	559.02	<0.001 HS
Ditches	184 (36.22)	78 (15.35)		
Ponds	26 (5.12)	118 (23.23)		
Tree holes	39 (7.68)	117 (23.03)		
Plastic cups	26 (5.12)	231 (45.47)		
Tyres	10 (1.97)	160 (31.50)		
Stagnant water	147 (28.94)	37 (7.28)		
Water containers	41 (8.07)	142 (27.95)		
Coconut shells	19 (3.74)	128 (25.20)		
Tins	4 (0.79)	173 (34.06)		
All of the above	9 (1.77)	0		
Don't know	35 (6.89)	0		
Others**	4 (0.79)	4(0.79)		
Stages in mosquito lifecycle*				
Egg	26 (5.12)	127 (25)	700.99	<0.001 HS
Larva	20 (3.94)	183 (36.02)		
Pupa	6 (1.18)	49 (9.65)		
Adult	15 (2.95)	25 (4.92)		
All of the above	10 (1.97)	118 (23.23)		
None of the above	15 (2.95)	2 (0.39)		
Don't know	420 (82.68)	19 (3.74)		
Resting habit of mosquitoes				
Indoor	93 (18.31)	102 (20.08)	193.64	<0.001 HS
Out door	225 (44.29)	114 (22.44)		
Both	67 (13.19)	228 (44.88)		
Don't know	103 (20.28)	13 (2.56)		

*Multiple responses possible; **Garbage and Bushes; HS- Highly Significant.

A total of 269 (53%) and 377 (74.2%) students were expressed the opinion that personal protection measures were the most effective way of preventing MBDs. A very low number of students (34; 6.7%) were aware about the role of 'fish in mosquito control', and this number increased to 450 (88.6%). Only 29 (5.7%) of students

knew about National vector borne disease control programmes in the pre-test and but the number increased to 390 (76.8%) in post-test (Table 4). The difference in knowledge about mosquito bionomics, knowledge of DF and Chickungunya and prevention and control of MBDs among students in pre and post-test was highly statistically significant (p<0.001).

Table 3: Knowledge and belief of students about DF and chikungunya (N= 508).

Knowledge	Pre test n (%)	Post test n (%)	Chi- square value	p- value
Names of MBDs*				
Malaria	374 (73.62)	418 (82.28)	87.76	<0.001 HS
Dengue	268 (52.75)	371 (73.03)		
Chikungunya	232 (45.67)	392 (77.17)		
Filariasis	59 (11.61)	186 (36.61)		
Others**	34 (6.69)	2 (0.39)		
Source of information*				
TV	114 (22.44)	224 (44.09)	170.25	<0.001 HS
Relatives	75 (14.76)	99 (19.49)		
News paper	41 (8.07)	172 (33.86)		
Radio	9 (1.77)	70 (13.78)		
Doctor	39 (7.68)	287 (56.50)		
Para medical staff	15 (2.95)	70 (13.78)		
School study	238 (46.85)	361 (71.06)		
Don't know	23 (4.53)	2 (0.39)		
Is all genus of mosquitoes responsible for DF and chikungunya?				
Yes	251 (49.50)	77 (15.16)	136.31	<0.001 HS
No	257 (50.59)	431 (84.84)		
High mosquito density season*				
Pre-monsoon	55 (10.83)	13 (2.56)	258.38	<0.001 HS
Monsoon	377 (74.21)	256 (50.39)		
Post monsoon	44 (8.66)	300 (59.06)		
Don't know	32 (6.30)	4 (0.79)		
Perceived causes of getting MBDs*				
Mosquito bite	382 (75.20)	404 (79.53)	119.36	<0.001 HS
Drinking dirty water	182 (35.83)	37 (7.28)		
Over work	24 (4.72)	14 (2.76)		
Eating sweet or sour or cold food	28 (5.51)	5 (0.98)		
Too much exposure under sun	33 (6.50)	7 (1.38)		
Irregularity in taking meals	29 (5.71)	2 (0.39)		
Don't know	15 (2.95)	4 (0.79)		

* Multiple responses possible; **Swine flu and Cancer; HS- Highly Significant.

DISCUSSION

This study aims to raise awareness about MBDs among and provide guidance to the students on the prevention and management of MBDs.[15] Health education is generally accepted as an important, cost effective, primary level of preventive measure.[16] During pretest, the students knew more about Malaria than about DF and Chikungunya. Even though Pondicherry is endemic to filariasis only 59 (11.6%) students knew about filariasis and this number increased to 186 (36.6%), after they attended the health education session, and the level of students' knowledge improved on other MBDs also. First, students didn't know enough about container breeding sites and couldn't associate plastic cups, tins, tyres, tree holes, water containers and coconut shells with breeding sites. 19 (3.74%) students, who were aware that coconut shells could serve as breeding sites for Aedes mosquitoes.

A study was conducted in Pondicherry among 1674 respondents, and 71 (4.24%) of them knew that coconut shells could serve as breeding sites for mosquitoes.[17]

Even though Pondicherry is a coastal area, people are not aware of containers serving as breeding sites. To educate the school students about Mosquito Born Diseases (MBDs), mosquito bionomics, modes of disease transmission and control measures should be taught even at the school age. In the present study, only 11 (2.17%) students were aware about the day biting habit of the Aedes mosquitoes. A similar result was found in a study which was conducted in Jamaica among 188 residents, in that 5 (2.7%) were knew about the day biting nature of Aedes mosquito. However, awareness about the biting time of these mosquitoes was found as same as with the previous study.

Table: 4: Prevention and control against MBDs (N=508).

Knowledge	Pre test n (%)	Post test n (%)	Chi- square value	p-value
Preventive measures against MBDs*				
Personal protection measures	269 (52.95)	377 (74.21)	105.16	<0.001 HS
Consuming DEC tablets	21 (4.13)	27 (5.31)		
All of the above	57 (11.22)	96 (18.90)		
Don't know	5 (0.98)	127 (25.00)		
Role of fish in mosquito control				
Yes	34 (6.69)	450 (88.58)	682.84	<0.001 HS
N	474 (93.31)	58 (11.42)		
Know about Vector borne disease control program				
Yes	29 (5.71)	390 (76.77)	529.32	<0.001 HS
No	479 (94.29)	118 (23.23)		

*Multiple responses possible; HS- Highly Significant.

Two hundred and thirty-eight (46.85%) students were indicated that 'school study' is the predominant source of information about MBDs. In a study conducted in Brazil, 172 (61.6%) control group students were replied that their main source of information was school teaching.[20] Indeed the awareness created by school teaching there was lower than in the earlier study. However, the students' exposure in the school is high because the students spend much of their time in the school environment rather than outside. 50.39% and 59.06% of students were aware about the high mosquito density during monsoon and post monsoon periods, respectively.[21] One hundred and eighty-two (35.8%) students believed that drinking dirty water can cause DF and Chikungunya and the number was reduced to 37 (7.3%) during posttest. Only 6% of students knew about the involvement of fish in mosquito control, which is similar to the findings of Muninarayana et al among adults in Kolar.[22]

Study revealed that school health education programs utilizing interactive lecture methods and Audio visual aids (videos, etc.) helped students to improve their knowledge regarding selected mosquito borne diseases. Students showed interest in learning about vectors and their role in disease transmission. Health Education could be an effective medium in promoting health and possibly behavioral changes in the community because imparting health education to school students is the starting point for ensuring community participation. The need now would be to sustain this activity and implement it in schools as part of the vector borne disease control program. Schools and teachers should give preference to community-oriented problems and educate the students about them with the involvement of all stake holders. IEC (Information, Education and Communication) materials may be provided among the school's students, thereby making it more accessible about the community. Information about Dengue, vectors and modes of disease transmission may be incorporated into the school curriculum, especially in areas where dengue is highly prevalent.

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