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## Original Article

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# Perceptions and preventive practices related to mosquito-borne diseases among school students in Kancheepuram district, Tamil Nadu

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### Abstract:

**Background:** Mosquitoes and other vectors are responsible for 17% of all infectious diseases globally. Considering the increasing burden and socioeconomic impact of mosquito-borne diseases, the most effective control measure is to empower people with essential information and encourage them to adopt preventive and protective measures.

**Objective:** This study was done among school children to identify their perceptions on mosquito-borne diseases in terms of knowledge and attitude and related preventive practices, as part of an awareness programme.

**Methods:** This was a descriptive, cross-sectional study conducted among students of classes 9 to 12, in a selected school of Kancheepuram district, Tamil Nadu in January 2017, using a pre-tested, semi-structured, self-administered questionnaire.

**Results:** A total of 400 students participated in the study; 64.5% were males. Malaria (96.8%), Dengue (84.8%) and Chikungunya (71%) were the commonest diseases known. While 62.7% identified symptoms of common mosquito-borne diseases, only 2.5% were aware of vectors involved. 82% of students opined that malaria control is combined responsibility of Government, community and individual. Mosquito nets (63%) were the commonest protective measure used. More than 90% kept water containers and storage tanks covered and clean. More than 75% reported practicing one or more environmental measures to prevent mosquito breeding. The mean knowledge score was 4.28 (SD±1.28). Higher mean scores were observed among males and higher classes of study ( $p < 0.05$ ).

**Conclusion:** The results of this study could be reflective of perceptions and practices of the families and communities. School-based awareness programmes and integration of disease control measures in curriculum with field-based activities could motivate children to adopt preventive and protective measures and promote the same in their communities.

**Key words:** Mosquito-borne diseases, Mosquito control, Mosquito control measures, School students

### INTRODUCTION:

Mosquitoes are one of the deadliest and invincible animals in the world, causing millions of deaths every year, owing to their ability to carry and transmit infectious agents to a widespread population. <sup>1</sup> Mosquito-borne diseases especially Malaria, Lymphatic Filariasis, Japanese encephalitis, Dengue and Chikungunya along with other vector-borne diseases constitute about 17% of all infectious diseases globally. <sup>2</sup> In 2017, India was one of the top five countries which accounted for nearly half the malaria cases worldwide. <sup>3</sup> Besides causing substantial morbidity and mortality, these diseases act as significant deterrent to socio-economic development. The increasing burden of mosquito-borne diseases is an issue of serious concern considering the fact that most of these diseases are preventable through informed protective measures. <sup>2</sup>

Most mosquito control measures require inter-sectoral coordination and active community participation.

Community participation in turn depends on adequate awareness and positive attitudes among the population. In the absence of any effective vaccine to prevent above diseases, the most economic and effective method to control them would be awareness building regarding the disease and promotion of preventive and protective practices in the community.

Many studies have assessed the community perceptions and practices in different parts of country with varying inferences. <sup>4,5</sup> There is paucity of studies assessing the same among students. School-based awareness programmes are an economic and powerful means of raising community health awareness. Children take back to their parents the health instructions they receive in schools and apply this knowledge to their own families. This study was done with the purpose of identifying the perceptions on mosquito-borne diseases in terms of knowledge and attitude and related preventive practices among students in classes 9<sup>th</sup> to 12<sup>th</sup> in a school in Kancheepuram district, Tamil Nadu.

**METHODS:**

This was a descriptive, cross-sectional study conducted among students belonging to classes 9<sup>th</sup> to 12<sup>th</sup>, in a randomly selected school in Kancheepuram district in January 2017. The sample size was calculated based on the proportion of students who were aware that only female mosquitoes bite (80.5%) as reported by Taran et al <sup>6</sup> in a higher secondary school in Malwa, using the formula  $N = (Z^2_{1-\alpha/2} PQ) / d^2$ , where N= required sample size;  $Z^2_{1-\alpha/2}$  at 0.05 significance level= 1.96; P is the prevalence, 80.5; Q= 100-P and d was the tolerable level of error as percentage of P fixed at 5%. The sample size derived was 372 and assuming 10% non-response, the final sample size arrived at was 410.

After Ethical approval and requisite permission from school authorities, the students enrolled in classes 9 to 12 were enlisted. Depending on the total number of students in each class, a proportionate number of students were selected from each class by simple random sampling using the roll register, to obtain a final sample size of 410. The selected students were briefed about the study and their parents were sent an information sheet and a consent form requesting the participation of their children in the study. After receiving written informed consent from parents, the students were administered a pre-tested, semi-structured questionnaire consisting of 28 items, divided into 4 sections- Section A: socio-demographic characteristics, Section B: knowledge about mosquito-borne diseases and their control, Section C: their attitude towards the diseases and control and Section D: preventive and protective practices adopted by the students and their families against mosquito borne diseases. Complete privacy and confidentiality were ensured. After completion of questionnaire, correct answers were provided and a health education programme using audio-visual aids was organized for all students. An information pamphlet developed in English and Tamil, on prevention and control of mosquito-borne diseases was distributed to the students.

The data collected was entered in Microsoft Office Excel 2007 and statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 23. Frequency distribution was calculated for all variables. Independent student t-test and Analysis of Variance were used to test the significance of difference in mean knowledge score among baseline categories.

**RESULTS:**

A total of 400 students participated in the study. Table 1 describes the distribution of baseline characteristics among the study population.

**Table 1: Baseline socio-demographic characteristics of study population**

Variable	Frequency (N=400)	Percentage
<b>Age (in years)</b>		
13	48	12
14	98	24.5
15	109	27.25
16	95	23.75
17	50	12.5
<b>Gender</b>		
Males	258	64.5
Females	142	35.5
<b>Class of study</b>		
IX	94	23.5
X	125	31.25
XI	93	23.25
XII	88	22
<b>Father's educational status</b>		
Incomplete schooling	39	9.75
Completed school	39	9.75
Diploma	61	15.25
Undergraduate	128	32
Postgraduate	72	18
Professional	61	15.25
<b>Mother's educational status</b>		
Incomplete schooling	58	14.5
Completed school	71	17.75
Diploma	6	1.5
Undergraduate	177	44.25
Postgraduate	74	18.5
Professional	14	3.5
<b>Mother's occupational status</b>		
Not working	254	63.5
Working	146	36.5
<b>Type of house</b>		
Pucca	390	97.5
Semi-pucca	7	1.75
Kutcha	3	0.75

The perceptions related to mosquito-borne diseases among students were assessed under 2 heads: Knowledge and attitudes related to mosquito-borne diseases and their control and the participants' responses are categorized under table 2 and table 3 respectively.

**Table 2: Distribution of knowledge on Mosquito-borne diseases among study population**

Variable	Frequency (N=400)	Percentage
<b>Perceived knowledge on mosquito-borne diseases</b>		
Excellent	36	9
Good	170	42.5
Fair	138	34.5
Poor	21	5.25
No idea	35	8.75
<b>Source of information</b>		
Television	274	68.5
Radio	53	13.3
Schools	252	63
Banners and Brochures	50	12.5
Newspaper	232	58
Health worker	47	11.8
Family & Friends	87	21.8
Others	12	3
<b>Diseases transmitted by mosquitoes</b>		
Malaria	387	96.8
Filariasis	74	18.5
Dengue	339	84.8
Chikungunya	284	71
Yellow fever	31	7.8
Japanese encephalitis	26	6.5
<b>Mode of transmission (Answer: bite of mosquito)</b>	242	60.5
<b>Female mosquitoes bite (Answer: True)</b>	239	59.8
<b>Day biting mosquito (Answer: Aedes)</b>	68	17
<b>Correct identification of vectors</b>		
None correct	84	21
1 correct	153	38.3
2 correct	102	25.5
3 correct	51	12.8
4 correct	10	2.5
<b>Matching symptoms</b>		
None correct	89	22.3
1 correct	59	14.8
2 correct	1	0.3
3 correct	251	62.7
<b>Breeding site of Malaria vector- Correct answer</b>	30	7.5
<b>Malaria is preventable (Answer: True)</b>	355	88.8
<b>Malaria is curable (Answer: True)</b>	380	95

**Table 3: Attitude of study participants towards Mosquito-borne diseases**

Variable	Frequency (N=400)	Percentage
<b>How would you describe the possibility of any of your family member acquiring Malaria/ Dengue?</b>		
Very likely	9	2.3
Likely	54	13.5
Unlikely	164	41
Very unlikely	173	43.3
<b>What is the health care facility preferred by your family for symptoms suggestive of Mosquito-borne diseases?</b>		
Government	32	8
Private	214	53.5
AYUSH	116	29
Others	30	7.5
No idea	8	2
<b>How prompt will you seek treatment if any of your family members is suspected to have Malaria, Dengue or other mosquito borne diseases?</b>		
Within 24 hours	210	52.5
Within 2 to 3 days	95	23.8
Within a week	79	19.8
Do not know	16	4
<b>Responsibility of Mosquito-borne disease control</b>		
Government only	21	5.3
Private	9	2.3
Community	11	2.8
Government + Community	15	3.8
Government+ Community+ Individual	328	82
No idea	16	4

Table 4 shows the distribution of the preventive and protective practices adopted by the students and their families.

**Table 4: Distribution of Protective and preventive practices related to mosquito-borne diseases among study population and their families**

Variable	Frequency (N=400)	Percentage
<b>Personal protection practices against mosquito bites</b>		
Use of fan only	43	10.8
Use of bed sheets	79	19.8
Protective fully covered clothing	85	21.3
Use of mosquito insecticide coils	149	37.3
Use of insecticide repellent creams	131	32.8
Use of mosquito mats	139	34.8
Use of mosquito nets	252	63
Insecticide spraying	70	17.5
Screening of windows	191	47.8
Use of natural substances, like specific herbs	22	5.5
<b>Environmental practices to prevent mosquito breeding</b>		
Covering all water containers	375	93.8
Covering water storage tanks and wells	366	91.5
Covered ditches & other irregular surfaces to avoid water stagnation	314	78.5
Cleaning and covering garbage bins	346	86.5
Daily cleaning & scrubbing of water containers	307	76.8
Application of oil to the surface of water	142	35.5
Bury waste coconut shells	166	41.5
Safe disposal empty boxes and cans which can accumulate water	298	74.5
Changing water for plants at least once a week	310	77.5
Removing stagnant water under flower or plant containers	302	75.5
Cleaning the water in air-conditioners & refrigerators frequently	297	74.3

With a maximum possible score of 9 for knowledge, the mean knowledge score of the students was 4.28 (standard deviation 1.28). Table 5 reveals the distribution of mean knowledge score among selected baseline characteristics of participants.

**Table 5: Distribution of Mean knowledge score among baseline characteristics of participants**

Variables	Frequency (N= 400)	Mean score (SD)	P value
<b>Gender</b>			
Males	258	4.38 (1.3)	
Females	142	4.11 (1.2)	< 0.05
<b>Class of study</b>			
IX	94	3.84 (1.26)	
X	125	4.18 (1.2)	< 0.05
XI	93	4.42 (1.34)	
XII	88	4.74 (1.12)	
<b>Perceived knowledge on mosquito-borne diseases</b>			
Excellent	36	4.36 (1.27)	
Good	170	4.39 (1.26)	< 0.05
Fair	138	4.38 (1.21)	
Poor	21	4 (1.22)	
No idea	35	3.46 (1.4)	

## DISCUSSION:

This study was conducted to assess the knowledge, attitude and practices related to mosquito-borne diseases among school students of Kancheepuram district, Tamil Nadu. A total of 400 students participated in the study, among which 64.5% were males.

Apart from 3 families who resided in katcha houses and 7 families from semi-pucca houses, rest of our study population resided in pucca houses. Similar picture was also observed in the study by Taran et al in Malwa where only 4 students lived in katcha houses indicating a comparative demographic pattern.<sup>6</sup>

### Knowledge regarding mosquito-borne diseases

About three-fourths of the participants (77%) reported having good or fair knowledge on mosquito-borne diseases. Mass media such as television and newspapers and health education at schools were identified to be chief sources of information. The role of Newspapers and television as predominant sources of information among students was likewise reported by Bhatnagar et al in Meerut and Taran et al in Malwa.<sup>6,7</sup>

Most participants were aware that Malaria (96.8%), Dengue (84.8%) and Chikungunya (71%) were mosquito-transmitted diseases, yet less than one-fifth of participants mentioned about Filariasis, Japanese encephalitis and Yellow fever. Taran et al in their study reported similar distribution, where most participants identified Malaria, Dengue and Chikungunya, while knowledge of Filariasis, Yellow fever and Japanese encephalitis was low.<sup>6</sup>

Despite majority having knowledge about common mosquito-borne diseases, less than two-third participants, were aware about their mode of transmission (60.5%) and the role of female mosquitoes in disease transmission (59.8%). In contrast, Taran et al reported a higher proportion of positive

responses among students on the role of female mosquitoes in disease transmission (80.5%).<sup>6</sup> Among other studies the awareness on the role of female vectors varies, and is substantially low. In a study by Bahri et al in Saudi Arabia, only 25.5% students knew that female mosquitoes transmit diseases.<sup>8</sup> In Ramaiah et al study on dengue, 43% students reported that only female mosquitoes bite.<sup>9</sup> While only 17% percent of our students rightly identified day-biting mosquito, approximately half the students (49%) were aware about day-biting mosquitoes which transmit dengue, in Bhatnagar et al and Ramaiah et al study.<sup>7,9</sup> Considering mass media is the chief source of information and that more than 75% of students were aware about Government initiatives against mosquito-borne diseases in the above studies, the low proportions with regard to knowledge, alludes to the need for intensive health education efforts.

Fifteen percent of students could precisely associate at least three diseases with their vectors, although only 2.5% were able to associate all four vectors with diseases transmitted. In Bhatnagar et al study, 21% students could rightly identify the species involved in Dengue transmission.<sup>7</sup> More than 60% of the participants correctly identified the symptoms of three common mosquito-borne diseases, which was commendable, though it provides scope for improvement. Majority of the participants acknowledged that malaria was preventable (88.8%) and curable (95%), which was encouraging. Taran et al reported a similar picture where 86.5% of students considered mosquito-borne diseases as preventable.<sup>6</sup> The substantial level of awareness among students with regard to symptoms and the preventable and curable nature of the diseases could be harnessed to improve health-seeking behaviour and adopt appropriate preventive practices in the community.

#### Attitude related to mosquito-borne diseases

More than three-fourths (84.3%) of the study population believed that they were unlikely or very unlikely to acquire Malaria or Dengue. More than half the students and their families preferred private health care facility (53.5%) or Indian systems of Medicine (29%) for symptoms suggestive of mosquito-borne diseases. Preference for private sector was also reported by Patel AB et al in their study among an urban population in Rajkot.<sup>10</sup> While 52.5% reported seeking prompt health care by 24 hours, about three-fourths sought health care by two to three days.

In our study, 82% of the students opined that vector-borne disease control is the responsibility of Government, community and individual together. This proportion is comparatively higher than that reported by Ramaiah R et al from Karnataka where 83.19% of the students were of the opinion that Government alone is responsible for vector control and only 7.04% felt that Government and people have combined responsibility in vector control.<sup>9</sup>

#### Protective and preventive practices among participants and families

In our study, an approximate 30% of students reported using one or more of the following- mosquito insecticidal coils (37.3%), repellent creams (32.8%) and mosquito mats (34.8%). Sixty-three percent reported use of mosquito nets in their families and 47.8% reported using mosquito control screens for windows and doors. A similar study by Bahri et al in Saudi Arabia among secondary school students identified an identical distribution of use of mosquito control screens (46.2%), though the use of mosquito nets was only 30% which was lesser than that reported by our study.<sup>8</sup> Ramaiah R et al in their study in Karnataka report a higher use of insecticide spray (44%) by students, and a similar distribution of use of mosquito repellent cream (39%) and bed nets (47%).<sup>9</sup> Similar distribution was also observed by Bhatnagar et al in Meerut.<sup>7</sup> Taran et al in their study in Malwa report that most participants and their families use more than one personal protective measure.<sup>6</sup> Mosquito nets (71.3%) were the commonly used followed by mosquito coils (63.2%), liquid vaporizers (65.9%) and electric rackets (51.3%), while the mosquito control screens was the least commonly used method (24.1%).<sup>6</sup> Ramaiah R et al in Karnataka and Bhatnagar et al in Meerut reported that 73% of the students mentioned using full-sleeved clothing as one of the main protective measures against mosquito bites.<sup>7,9</sup> In our study, a proportion of students reported using only fans (10.8%) or bed sheets (19.8%) or full-sleeved clothing (21.3%), without any specific personal protective measures against mosquito bites which is of significant concern considering the high knowledge among the study group.

On enquiring about the preventive and protective practices followed by their respective families for mosquito breeding and control, maximum families reported using more than one method such as covering water sources, periodic cleaning of water containers and source reduction methods to eliminate other breeding places. In our study, more than 90% of the participants reported that they always kept their water containers, storage tanks and wells covered and 76.8% practiced daily scrubbing and cleaning of water containers. Dhaduk et al in their study in Jamnagar district report that only 47.3% kept their water containers covered and 28.67% scrubbed and cleaned their water containers daily.<sup>4</sup> In Bhatnagar et al study, an approximate 50% of the population were practicing any one or more of the following methods such as, covering overhead tanks, preventing water stagnation in tyres and broken pots or keeping coolers dry when not in use.<sup>7</sup> In the study by Ramaiah R et al 59% of the participants reported that overhead tanks were kept closed in their houses and 56% participants reported keeping coolers empty and dry when not in use.<sup>9</sup> A relatively higher proportion of our population (74.3%) reported regular cleaning of refrigerators, coolers and air-conditioners to avoid water stagnation. The above findings reveal that majority of the families in our study were practicing effective vector control measures.

Male students had a higher mean score for overall knowledge compared to the female students and the difference was statistically significant ( $p < 0.05$ ). In the Malwa study by

Taran et al, female students were found to be more aware of symptoms of mosquito-borne diseases. <sup>6</sup> In our study, the mean overall knowledge score showed an expected increasing trend in the higher classes ( $p < 0.05$ ).

### CONCLUSION:

The results of this study could be reflective of the perceptions and practices and the socio-demographic structure of the community to which they belong. Despite Government's best efforts to impart essential information through various media, the knowledge and attitude of the students vary widely among different studies and are less than satisfactory. Targeted health education programmes and integration of disease control measures as part of curriculum with active field-based activities could equip the students with essential knowledge to adopt preventive and protective measures and promote the same in their families and communities.

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