

Research Article

***Aedes-borne* disease awareness in Thiruvarur District of Tamil Nadu, India**

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A B S T R A C T

Background: In India, vector-borne diseases account for the high burden of all infectious diseases (WHO, 2020). Among these, Dengue Fever (DF) is the most common viral disease transmitted by *Aedes spp.* such as *Aedes aegypti* and *Aedes albopictus*.

Aim of the study: This study aimed to identify and assess the Knowledge, Attitude, and Practices (KAP) of Dengue fever among the University / College students in Thiruvarur district, Tamil Nadu, India.

Methods: A cross-sectional study was conducted at 13 University/ Colleges from Thiruvarur district. The targeted study group was above the age group of 17 years from the rural and urban settings of Thiruvarur district. The study instrument contains a questionnaire on knowledge, attitude, and practices regarding Dengue fever in university/ college students.

Results: In the present study, the prime source from which the students received information on Dengue Knowledge was from TV (68.6%). There was significant association between knowledge level and educational level ($X^2= 3.964$, $df=1$, $p < 0.05$), between knowledge, attitude and practices with the Institutional type ($X^2= 4.35$, 6.315 , 6.662 $df=1$, $p < 0.05$) and between practices and gender ($X^2= 3.866$ $df=1$, $p < 0.05$). There was positive moderate correlation between Knowledge and Attitude ($r=0.441$), between Attitude and Practice ($r=0.606$), and there was a positive weak correlation between Knowledge and Practice ($r=0.374$).

Conclusion: Despite having sufficient knowledge regarding dengue fever, students is still lacking in the knowledge of vector transmission and breeding grounds. This suggests that the public health authorities should implement future intervention strategies and conduct health education programs.

Keywords: Dengue Fever, University / College students, Knowledge, Attitude, Practice

Introduction

Dengue is one of the fastest-spreading acute mosquito-borne viral infections that causes fever, nausea, rash, vomiting, and aches/pains behind the eyes, muscles, joints/bones.¹ The disease is mainly transmitted by the bite of female *Aedes aegypti* mosquitoes. Nearly 3.9 billion cases are at risk globally, and approximately 400 million cases of Dengue infection have been reported.^{2,3} Over the last few years, approximately 50% of the world's population has been at risk of DENV infection, and about 50% live in Dengue endemic countries.⁴ Dengue can be controlled by the elimination of breeding sites such as clean stagnant water around houses, unused wells, unused pots, discarded plastic containers, discarded plastic sheets, open sintex tanks, pits with aquatic plants, cement tanks, discarded tyres, discarded iron pots, unused boats, coral holes, discarded washing machines, fallen coconut spathe, colocasia plant leaf axil.⁵ By implementing proper measures of prevention, such as the use of mosquito bed nets, repellent spray, and mosquito coils, Dengue prevention can be attained. The awareness, perception of severity, and susceptibility of Dengue and its practices are responsible for preventing and controlling dengue in that population.⁶ Source reduction and control programs by involving in community awareness helps in vector control.⁷ Dengue virus belongs to the family Flaviviridae and the genus Flavivirus having four serotypes DENV-1, DENV-2, DENV-3, and DENV-4.^{8,9} Each of the four serotypes has been found to be linked with more severe Dengue infections.¹⁰ It can produce a variety of symptoms, ranging from mild asymptomatic sickness to lethal Dengue hemorrhagic fever/Dengue shock syndrome (DHF/DSS).¹¹ More than a billion people worldwide had infected with Dengue, with an estimated 100 million new cases each year and causing 24,000 deaths.¹² Of the 500,000 cases of DHF requires hospitalization, and 20,000–25,000 deaths happen only in children. With significant growth in the size of the human population at risk, the cumulative burden of Dengue infections has reached an unprecedented percentage in recent decades.¹³ Dengue fever (DF) outbreaks have been documented in India for over two centuries. In India, the first significant Dengue outbreak occurred in Calcutta, West Bengal, in 1963 and quickly spread to neighboring regions, eventually impacting most of the country.¹⁴ In India, there were 123,106 cases documented, with 90 deaths as of October 31, 2021. Although there were no official updated reports available since the last CDTR report, according to several media reports, Dengue outbreaks are still prevalent in the country. Statistical data from the National Vector Borne Disease Control Programme (NVBDCP) in 2021 till October show that the Uttar Pradesh state recorded 21,687 Dengue cases with seven deaths after Punjab (16,511 cases with no death) and was followed by Madhya Pradesh (11,354 cases), Rajasthan (10,984 cases

with 39 death) and Maharashtra (10,320 cases with 22 death cases). In Tamil Nadu, the number of cases dropped out from 8,527 cases with five deaths in 2019 to 2,410 in 2020 but increased to 3,665 with no death in 2021. As per the Thiruvavur Public health data from Thiruvavur, Tamil Nadu, there were 145 confirmed cases reported in 2017. Thiruvavur district in Tamil Nadu recorded a spike in cases of Dengue from 2012 to 2014. The increase in cases may be attributed because of the post-cyclonic impact, which resulted in abundant rainfall and the establishment of breeding habitats.¹⁵ This article addresses three research questions. First, Is there prevailing level of Knowledge, Attitude, and Practices (KAP) among the student youth population towards Dengue fever. Second, is there any significant association between the level of Knowledge, Attitude, and Practice towards Dengue fever with Socio-demographic characteristics. Third, is there any correlation between the student respondent's Knowledge, Attitude, and Practices scores. The primary aim of this research was to determine University/College student's knowledge and attitudes about Dengue fever and the effectiveness of a health education intervention to increase student's knowledge and attitudes. Proper knowledge, attitudes, and practices are important concerning Dengue fever. The population's awareness and participation in community measures are equally essential as other public health interventions to control and prevent Dengue infection. Thus, in preparing students to deal with such a situation, investigation and imparting knowledge is very important. Therefore, this present study was planned to assess and enforce the knowledge and attitudes concerning Dengue and its prevention among the University / College students.

Materials and Methods

Study Area

The study was conducted in the Thiruvavur district of Tamil Nadu, located near the delta region of the Kaveri River. This district is bordered by Nagapattinam district to the north, Pondicherry district to the east, and Thanjavur district to the northwest. Geographically, it lies between the latitudes of 10°20' and 11°07' and longitudes of 79°15' and 79°45'. Since no previous KAP study on dengue fever had been conducted in the Thiruvavur district, it was chosen as the study area.

Study Groups

The study was conducted among university/college students in Thiruvavur district, Tamil Nadu, India. The targeted study group was above the age group of 17 years from the rural and urban settings of Thiruvavur district.

Study Period

The study was conducted over a period of six months, from December 2021 to May 2022

Sample size and Sampling Technique

The sample size (n = 574) was calculated using Cochran's formula, assuming awareness regarding Dengue fever among the students based on an 84% prevalence, at a 95% confidence coefficient level, with a 0.05% alpha error and a 3% absolute margin of error. This study employed convenience sampling by selecting students conveniently through visits to universities/colleges in different taluks of Thiruvavur district. Permissions were sought from the colleges beforehand. All departments in these institutes were contacted, and students were invited to voluntarily participate in the survey. The inclusion criteria included students who attended university/college regularly, both male and female participants aged 17 and above, and those who volunteered to participate in the study. The exclusion criteria included students with mental disabilities, those not enrolled in university/college, and those below 17 years of age.

Construction of the questionnaire

A standardized and well-structured questionnaire concerning socio-demographic profile, information on knowledge, attitude, and practices was developed according to the literature review of the KAP survey and validated the questionnaire with the experts, and incorporated the valuable suggestions in designing the questionnaire.

Data collection Procedure

The primary data for the study were collected from university/college students. The questionnaire was provided in the form of an online Google form, which had been pretested among students beforehand. The questions were validated, and any unclear items were revised for clarity. The final version of the questionnaire was used to assess the Knowledge, Attitudes, and Practices regarding dengue fever among college/university students. Participants were informed about the confidentiality of the survey and were instructed on how to access the google form via a link provided by their respective authorities or student representatives. The time required for respondents to complete the questionnaire was approximately 15-20 minutes. To ensure complete confidentiality and anonymity, no personal information was collected during the survey.

Ethics Approval and Consent to Participate

Ethical Approval was obtained from the respective authorities of the University / College administration. Participants were briefed about the study, and their consent was received via an online Google form. They were informed about the confidentiality and anonymity of the survey.

Statistical analysis

The data from the completed questionnaires were entered into MS Excel software and screened for analysis using the

SPSS 20 software package. Both descriptive and inferential statistics were performed. The analysis of the student's socio-demographic characteristics, knowledge, attitude, and practices was conducted in terms of frequencies and percentages. The mean, standard deviation (SD), median, and mode were used to compute the knowledge, attitude, and practice scores regarding dengue fever. Based on the responses, cumulative scores were calculated.

The Chi-square test was used to evaluate the strength of the association between knowledge, attitude, and practice with the socio-demographic variables, with a p-value of < 0.05 considered significant. The Pearson correlation was applied to identify correlations between knowledge and attitude, attitude and practices, and knowledge and practices towards dengue fever. Logistic regression analysis was performed to calculate the odds ratio (OR).

Results

Socio demographic details of the participants as shown in the Table 1. A total of 584 students were evaluated for knowledge, attitude and practices towards dengue fever. The majority of the participants (65.9%) were aged 17-20 years while 34% were aged 21 years and above. Significant portion of the participants were female (79.6%) and males accounting for 20.4%. Most participants (75.9%) were pursuing undergraduate studies, while 24.1% had postgraduate education or higher. Regarding residence, a large proportion of participants (75.5%) were from rural areas, whereas 24.5% were from urban settings. The family annual income of the majority (94.5%) was below 4 lakhs, and only 5.5% reported an income of 4 lakhs or more. In terms of housing conditions, 50.0% living in pucca houses, 25.9% in kutcha houses, and 24.1% in semi-pucca houses. Family size distribution showed that 61.6% of participants came from smaller families of 1-4 members, while 38.4% were from larger families with 5 or more members. Regarding the type of educational institution, 34.6% of participants were studying in government institutions, while 65.4% were enrolled in private institutions.

Table 1. Socio-demographic profiles of the participants

Socio-demographic Variables	Frequency (n)	Percent (%)
Age Group		
17-20 years	385	65.9
>=21 years	199	34.0
Sex		
Female	465	79.6
Male	119	20.4

Education		
Undergraduate	443	75.9
Postgraduate and Above	141	24.1
Residence		
Rural	441	75.5
Urban	143	24.5
Family Annual income		
< 4 lakhs	552	94.5
4 lakhs and > 4 lakhs	32	5.5
Housing		
Kutcha	151	25.9
Semi pucca	141	24.1
Pucca	292	50.0
Family Size		
1-4	360	61.6
>=5	224	38.4
Type of Institution		
Government	202	34.6
Private	382	65.4

The study revealed that a vast majority of participants (98.3%) had heard about dengue fever, but only about half (50.9%) were aware that it is caused by a virus. Most participants (94%) correctly identified mosquito bites as the mode of dengue transmission, although some wrongly believed that the transmission is associated with contaminated food and water (13%) or bites from lice, ticks, or mites (70.4%). Regarding breeding sites for dengue mosquitoes, participants recognized several sources such as stagnant clean water (77.2%), unused wells (77.7%), and open sintex tanks (84.1%). Other common sites identified included discarded tires (81.3%), pleated plastic sheets (69%), and discarded plastic containers (73.1%). However, some participants incorrectly identified breeding linked to drains and garbage (14.9%) or septic tanks (18.5%). Most participants (76.5%) knew that dengue mosquitoes primarily bite during the day. Symptoms like fever (96.2%), body pain (81.8%), and headache (75.2%) were well-recognized, while awareness of other symptoms like rashes (44.3%), ocular pain (38.4%), and muscular or joint pain (58.9%) varied. Knowledge about treatment included intravenous fluid rehydration (42.1%), paracetamol use (58.2%), and

antiviral medications (71.6%). However, 55.3% incorrectly identified antibacterial treatment as effective. Over half (55%) of the participants were aware of the availability of medications or vaccines for dengue. Importantly, 90.2% agreed that eliminating mosquito breeding grounds could prevent dengue, demonstrating a good understanding of control measures as shown in the Table 2.

Table 2. Knowledge about Dengue Fever (Spread, Symptom and Treatment)

Questions		N	Percent (%)
Have you heard about Dengue? (Yes)		574	98.3
Is Dengue caused by a virus? (Yes)		297	50.9
How is Dengue transmitted to humans?			
1.	Mosquito bites (Yes)	546	94
2.	Contaminated Food and Water (No)	73	13
3.	Bite by lice/ticks/mites (No)	411	70.4
What are the breeding sites for Dengue mosquitoes?			
1.	Stagnant clean water (Yes)	451	77.2
2.	Clean water holding containers (Yes)	326	55.8
3.	Artificial Collection of water in drums/sumps (Yes)	323	55.3
4.	Unused wells (Yes)	454	77.7
5.	Cement tanks (Yes)	433	74.1
6.	Open Sintex tanks (Yes)	491	84.1
7.	Pleated plastic sheets (Yes)	403	69
8.	Ponds (Yes)	314	53.8
9.	Tree holes (Yes)	231	39.6
10.	Irrigation canal (Yes)	267	45.7
11.	Pits with aquatic plants (Yes)	303	79.3
12.	Coconut shells (Yes)	463	51.9
13.	Fallen coconut spathe (Yes)	311	53.3
14.	Discarded tyres (Yes)	475	81.3

15.	Discarded plastic containers (Yes)	427	73.1
16.	Discarded iron pots (Yes)	349	59.8
17.	Discarded washing machines (Yes)	321	55
18.	Unused boats (Yes)	372	63.7
19.	Coral holes (Yes)	211	36.1
20.	Colocasia plant leaf axil (Yes)	327	56
21.	Drains and Garbage (No)	87	14.9
22.	Septic tank (No)	108	18.5
Dengue mosquito bite time/feeding habit			
1.	Day (Yes)	447	76.5
2.	Night (No)	263	45
3.	Both Day and Night (No)	169	28.9
What are the common symptoms of Dengue?			
1.	Fever	562	96.2
2.	Body Pain	478	81.8
3.	Headache	439	75.2
4.	Rashes	259	44.3
5.	Muscular and joint pains	344	58.9
6.	Diarrhea	332	56.8
7.	Vomit	384	65.8
8.	Ocular (Eye) pain	224	38.4
Treatment for suspected dengue			
1.	Intravenous (IV) fluid rehydration	246	42.1
2.	Paracetamol	340	58.2
3.	Anti-viral	418	71.6
4.	Anti-bacterial	323	55.3
Is there medications or vaccines commercially available against Dengue fever? (Yes)		314	55
Does eliminating breeding grounds of dengue mosquito will prevent dengue? (Yes)		527	90.2

The Figure 1 showed the various sources of information that contributed to people's knowledge about dengue fever. Television was the most common source, with 68.6% of participants reporting it as their primary medium. Schools also played a significant role, providing information to 62% of the respondents. Internet and social media were reported by 51.2% as a source, followed by newspapers at 47.26%. Awareness campaigns contributed to 43.32% of responses, while family discussions accounted for 31.85%. A smaller portion of participants, 2.4%, stated they were unaware of any sources of information on dengue. These findings highlighted the importance of mass media, education, and campaigns in spreading dengue awareness.

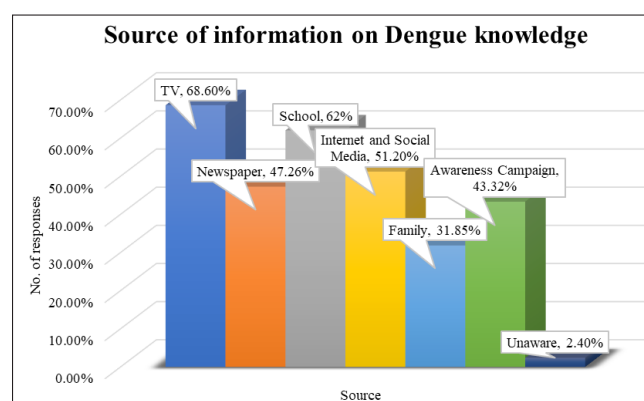


Figure 1. Graph Showing the Source of Information on Dengue Knowledge towards Dengue Fever

Despite a high percentage of respondents receiving information from reliable sources such as television, schools, and awareness campaigns, there are gaps in knowledge regarding the basic yet critical aspect of dengue vector control, the breeding sites of mosquitoes. This suggests that while information dissemination is widespread, it may lack clarity, specificity, or contextual relevance. General awareness campaigns may focus on transmitting broad messages rather than emphasizing detailed and actionable knowledge about breeding site elimination. Furthermore, the retention and application of this information could be influenced by educational level, cultural perceptions, or a lack of practical demonstrations. Addressing these gaps requires more targeted educational initiatives that not only provide information but also engage communities in identifying and eliminating breeding sites, thereby strengthening vector control measures.

The primary source of water for household purposes was municipality corporation water, which was used by 74.1% of respondents. Other sources included river, lake, or pond water (22.8%), well water (20.9%), and lorry-supplied water (11.5%) (Table 3). Regarding the storage of water for future use, the majority of participants reported storing water

due to failed rains (73.5%) and drought conditions (72.9%). Additionally, 56.5% stored water because their wells had dried out, while 45.5% did so due to delays in the supply of municipality water (Table 4).

Table 3. Source of water for use of household purposes

Source of water for use of households	n	%
Municipality Corporation water	433	74.1
River / Lake / Pond water	133	22.8
Lorry water	67	11.5
Well water	122	20.9

Table 4. Storage of water for future use

Need for storage of water for future use	n	%
Failed Rain	429	73.5
Drought	426	72.9
Municipality water delays	266	45.5
Well water dried out	330	56.5

There was a significant association between the level of knowledge regarding dengue and certain socio-demographic variables. Participants with higher educational levels, such as postgraduates and above, were more likely to have good knowledge about dengue (79.4%) compared to undergraduates (71%). This difference was statistically significant with a p-value of 0.046 and an odds ratio (OR) of 1.587, indicating that postgraduates were 1.6 times more likely to have good knowledge than undergraduates. The type of institution was also associated with knowledge levels. Participants from government institutions had better knowledge (78.2%) compared to those from private

institutions (70.2%). This difference was statistically significant with a p-value of 0.037 and an OR of 1.527, meaning that individuals from government institutions were 1.5 times more likely to have good knowledge about dengue than those from private institutions (Table 5). These findings highlighted the role of education level and institutional type in influencing awareness and understanding of dengue.

There was a significant association between the type of institution and both attitude and practice levels toward dengue fever. Participants from government institutions were more likely to have a positive attitude (98%) compared to those from private institutions (93.2%). This difference was statistically significant with a p-value of 0.012 and an odds ratio (OR) of 3.615, indicating that individuals from government institutions were over three times more likely to exhibit a positive attitude than those from private institutions (Table 6).

Similarly, the type of institution and gender were associated with practice levels toward dengue prevention. Government institution participants demonstrated better practices (84.2%) compared to private institution participants (74.9%). This was statistically significant with a p-value of 0.01 and an OR of 1.783, meaning that individuals from government institutions were 1.8 times more likely to follow good practices. The female participants were more likely to engage in good practices (79.8%) compared to males (71.4%). This difference was statistically significant with a p-value of 0.049 and an OR of 1.579, indicating that females were 1.6 times more likely to adopt good dengue prevention practices than males (Table 7). These findings emphasized the influence of socio-demographic factors such as institutional type and gender on attitudes and practices toward dengue control and prevention.

Table 5. Association of level of knowledge regarding Dengue with socio demographic variables

Socio-demographic variable	Good knowledge		Poor knowledge		x ²	df	p value	OR
	no.	%	no.	%				
Educational level								
Undergraduate	314	71	129	29.10	3.964	1	0.046*	1.587
Postgraduate and above	112	79.40	29	20.60				
Type of Institution								
Government	158	78.20	44	21.80	4.35	1	0.037*	1.527
Private	268	70.20	114	29.80				

*p<0.05

Table 6. Association of Attitude level towards Dengue fever with the Socio-demographic variables

S. No.	Socio-demographic variable (Type of Institution)	Positive Attitude		Negative Attitude		x ²	df	p value	OR
1	Government	198	98.00%	4	2.00%	6.315	1	0.012*	3.615
2	Private	356	93.20%	26	6.80%				

*p<0.05

Table 7. Association of Practice level towards Dengue fever with the Socio-demographic variables

Socio-demographic variable	Good Practice		Poor Practice		x ²	Df	p value	OR
	no.	%	no.	%				
Gender								
Female	371	79.80%	94	20.20%	3.866	1	0.049*	1.579
Male	85	71.40%	34	28.60%				
Type of Institution								
Government	170	84.20%	32	15.80%	6.662	1	0.01*	1.783
Private	286	74.90%	96	25.10%				

*p<0.05

There was a moderate positive correlation between knowledge and attitude ($r = 0.441$), indicating that individuals with better knowledge about dengue were more likely to have a positive attitude. A stronger moderate positive correlation was observed between attitude and practice ($r = 0.606$), showing that those with a positive attitude were more likely to engage in good dengue prevention practices. However, the correlation between knowledge and practice was weaker ($r = 0.374$), suggesting that having knowledge alone did not always translate into consistent preventive practices (Table 8). These findings highlighted the interconnected nature of knowledge, attitude, and practices, emphasizing the need for comprehensive education and behavior change interventions to improve dengue prevention efforts.

Table 8. Correlation between knowledge, attitude and practices scores of the respondents

S.No.	Variables	R	Interpretation
1	Knowledge-Attitude	0.441** (S)	Moderate positive correlation
2	Attitude-Practice	0.606** (S)	Moderate positive correlation
3	Knowledge-Practice	0.374** (S)	Weak positive correlation

**p<0.05, S – Significant

Discussion

The study highlighted key findings regarding the knowledge, attitude, and practices (KAP) of respondents toward dengue fever, revealing important insights for public health strategies. While a high percentage of participants had heard about dengue and were aware of its viral origin and mosquito-borne transmission, gaps were observed in the understanding of specific breeding sites and symptoms. Despite the availability of reliable information sources such as TV, schools, and social media, misconceptions persisted, underscoring the need for targeted awareness campaigns

that emphasize critical aspects of dengue prevention, such as identifying breeding sites and early symptoms. In the present study, most 382 students (65.4%) are pursuing their education in a private institution. The prime source from which the students received information on Dengue Knowledge was TV (68.6%), School (62%), the Internet, and social media (51.2%). Several other studies reported similar findings that TV was found to be the most important and major source of information.¹⁵⁻²⁶ This is because TV is a major mass media that disseminate knowledge and information to people from all socio-economic background among all age groups.²⁷⁻²⁹ Therefore, TV can play a significant role in imparting knowledge for a better understanding of dengue prevention.^{30,19}

The mean score of knowledge of Dengue among the respondents was 26.38(59.95%) and the knowledge score ranged between 0 to 40. The study findings were consistent with the findings of³¹ where the mean knowledge percentage was 55.3%. In this study, majority of the students 574(98.3%), believed that they have heard about Dengue. Similar findings in another study by²¹ found that about 90% of the participants interviewed were aware of Dengue fever. Of the respondents, half (50.9%) agreed that Dengue is caused by a virus, while 94% were aware that it was transmitted through mosquito bites. This finding is consistent with the³² where 82.7% of the respondents knew that the mode of infection is through mosquito bites. But, about 83.7% of the students had a misconception that it can be transmitted by contaminated food and water. This finding is not in concordance with the results of previous studies.¹⁶

Most of the students (76.5%) were aware that the Aedes mosquito bite during the day. In another study in Cambodia similar results were observed, where 74% of respondents answered that Aedes mosquitoes bite during the day.³³ This was World Health Organization (WHO) particularly mentioned that Aedes mosquito generally bites during the daytime.³⁴

Regarding the symptoms and signs, 96.2% knew that fever as the most common symptom, followed by Body pain (81.8%) and Headache (75.2%). These results are in similar with the other findings which fever is the most obvious symptom by all of them.^{21,26,27,35-40} The respondents who were unable to identify the other typical symptoms of Dengue fever, like Ocular pain may not have personally experienced the disease or may not witness it among their family, friends, or neighbors.³⁹

The majority of the students (90.2%) knew that eliminating the breeding grounds of Dengue mosquito would prevent Dengue. The findings of the recent study correlate to results from previous research, where it was also found that the elimination of mosquito breeding grounds is the most prevalent choice for vector control.^{21, 41, 39}

The majority of the students (94.9%) showed a positive attitude towards Dengue prevention, having a mean score of 33.55(72.82%) with a SD (6.98). Similar results were reported by other authors which said that most of the respondents have a positive attitude.^{24,36} This indicates that most of them have a perceived risk and positive attitude towards Dengue prevention. About 46.2% of the student respondents have a neutral stand towards Dengue being a significant problem in Thiruvavur district, 64% of them strongly agreed that affected individuals require immediate treatment for Dengue infection, 40.1% of them believed that Dengue fever could be cured. This finding was in concordance with the previous study by⁴² which indicates that 60% were reported as a curable disease. About 62.5% of them strongly agree that the elimination of larval breeding is the responsibility of both public and government authorities. Similar findings⁴³ reported that 44.3% said it has high morbidity. Surprisingly only 14.3% strongly agreed and 18.8% agreed that they open the doors/windows of your house during fogging activities. It is recommended to keep their doors and windows open because the amount of insecticide in the fog is very low and there is no health consequences faced to those who are exposed to the fog. About 28.4% disagreed that eliminating the breeding site of the Dengue-causing mosquito is complicated and time-consuming. This finding indicates that education on community participation is very much essential to control the breeding sites.⁴⁴ Half of the students strongly agreed that Dengue fever could be prevented and controlled and 34.8% of them agreed that they have an essential role in Dengue fever prevention which is in aligned with¹⁵ where most of the respondents strongly agreed or disagreed to the statement that they can curb Dengue fever. About 62.0% of the students strongly agreed that they would allow health officials to conduct inspections around their homes. This finding was similar to the study by¹⁵ where 50% strongly agreed.

The mean score of the practices towards Dengue fever was 10.34 (68.93%), with a S.D. (3.35) scores ranging from 0 to 15. Analysis of preventive practices among the University /College students indicated that 93% of them removed stagnant water to eliminate mosquitoes, 84.8% of them cleaned garbage/trash around their houses, and 77.9% of them cleared up bushes/vegetation around houses to reduce mosquitoes. This is in accordance with the findings of²⁷ in South Delhi, where (55.7%) of the respondents reported that cleaning the surroundings was the most important control measure. About 72.9% of them in their houses turned over/covered containers to avoid water collection, 76.9% of them properly covered the water stored for construction activity to prevent the breeding of mosquitoes, 85.8% of them refill the water tank for cattle's and clean them often, and 88.4% of them changed the water in the container frequently. In alignment with this finding of the study, it was found in a previous study that covering water containers and disposing of water from them was the most frequent practice used to avoid mosquito breeding in containers containing water for households.^{21,36}

Using fans for repelling mosquitoes (81.7%) is the most common personal preventive practice followed by the respondents and using creams for repelling mosquitoes (34.4%) were the least common practice. In another study¹⁶ using creams for repelling mosquitoes (31.3%) was found concordance with present study findings. However, it is inconsistent with using of fans for repelling mosquitoes (16.2%). As fans are cost-efficient and a common accessory used by most households, they became a standard preventive measure against mosquitoes. 70% of them used mosquito bed nets to avoid mosquito bites, 51.2% of them used insecticide to kill mosquitoes, 47.1% of them use window screening to prevent entry of mosquitoes into their room, and 41.6% of them wore light-colored and fully covered clothes to avoid mosquito bite. A similar finding was observed in the previous study that only 1/3rd of the respondents reported that they wore light-colored clothes.⁴⁵ Nearly 90% of them allowed government officials to spray insecticides (fogging). These findings are consistent with the study done by³⁹ which revealed that spraying and vector controlling strategies are the most common preventive measures. According to the results of this study, the majority of the respondents (74.1%) were using municipality corporation water for their households, and 73.5% and 72.9% of the respondents were storing water for future use because of failed rain and drought respectively. In the present study, it was observed that there was a significant association between knowledge level and socio-demographic variable; Educational level ($X^2= 3.964$, $df=1$, $p < 0.05$). In concordance to association between educational level and knowledge, it was found from a previous study that

there is significant association between knowledge level and educational status which indicates that as educational qualification increases, the level of knowledge they possess on Dengue fever also increase.^{21,46-48} There was significant association between knowledge, attitude and practices with the socio-demographic variable; Institutional type ($\chi^2=4.35, 6.315, 6.662$ df=1, $p < 0.05$). Regarding the Institutional type as government conducts awareness campaigns and health-education programs mainly in government institutions, therefore students from government college's gains more knowledge than from private colleges. Also, the result indicates that the private institutions limit the attention to imparting knowledge on vector biology but not encouraging to translate into preventive practices.⁴⁹ But Government institutions motivate their students to create an atmosphere of hygiene by their own means like routine cleaning-up activities equipping them with better preventive practices towards vector control and management. So, knowledge and community measures should be established involving all educational platforms.

Conclusion

According to the results of the findings, there was a positive moderate correlation between Knowledge and Attitude ($r=0.441$). This is in line with other KAP studies which showed a correlation between knowledge and practice.^{28, 36,42,53,54} According to the results of the findings, there is an appositive moderate correlation between Attitude and Practice ($r=0.606$), and there is a positive weak correlation between Knowledge and Practice ($r=0.374$). This indicates that the attitudes and practices increase as their knowledge increases. The findings in this study were correlated with the other previous study by⁵⁰ which revealed correlation between knowledge on Dengue with positive attitude for Dengue control and⁵¹⁻⁵³ found correlations between positive attitude and good practice of Dengue prevention. Concerning the correlation between knowledge and practices, it was reported a similar finding that shows positive association in other research study by.⁵⁴ In this present study, an efficient and long-term strategy for transforming community knowledge into practices is very much essential. Overall, changing people's attitudes and practices toward Dengue prevention is vital to combat poor attitudes and practices in the study population.

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