

Knowledge, Attitude and Practices regarding Dengue among Outpatients and their Attenders in Three Primary Health Care Centres in Coimbatore, Tamil Nadu, India

SK SENTHIL KUMAR¹, P KALIDAS², P PRITHIVIRAAJ³, E PRIYANKA⁴, S PRIYA⁵, S PRIYADARSHINI⁶, S PRIYANKA⁷

ABSTRACT

Introduction: Dengue is an arboviral disease transmitted by *Aedes aegypti* Mosquitoes with incidence of 50 to 100 million infections annually worldwide. Since no effective vaccine for Dengue is commercially available as of now, vector control programmes are of utmost importance in controlling the disease for which assessment of community participation is crucial.

Aim: To assess the knowledge, attitude and practices regarding Dengue among the outpatients and accompanying persons attending three Primary Health Centres in Coimbatore and to compare the knowledge scores between subjects based on their educational qualification.

Materials and Methods: This was a cross-sectional community-based study conducted among 300 subjects within the age group of 18 to 75 years. The study was questionnaire-based and was conducted among the outpatients and accompanying persons visiting three primary health centres in the city within one month. The questionnaire had 20 questions (15 on knowledge, four on attitude and one on practices). Knowledge was scored from 0 to 23 and comparison of results were done between two groups (subjects who had studied below class 10

and subjects who had studied above class 10). Data analysis was done using SPSS software version 20.0 and independent t-test. The p-value<0.05 was taken as statistically significant.

Results: Out of the 300 participants, 255 submitted completed questionnaires and the mean knowledge scores of individuals who had studied below class 10 and individuals with educational qualification above class 10 were 9.71 and 10.64 respectively and the difference in knowledge scores was statistically significant (p-value=0.014). It was found that persons with higher education tend to have better knowledge of Dengue; this signifies the need to focus health education efforts towards persons with lower education level by conducting awareness campaigns in the future.

Conclusion: To conclude, majority of the present subjects had average knowledge of Dengue. The overall attitude and practices of the participants towards Dengue care, prevention and control are good. Thus measures to improve the community participation in Dengue prevention control and management has to be reinforced periodically through health education campaigns, mass media and creating awareness at individual level.

Keywords: Aetiology, Dengue fever, Epidemiology, Prevention and control, Transmission

INTRODUCTION

Dengue is an arboviral disease caused by the Dengue Virus (DENV), belonging to the family Flaviviridae [1-4]. It is transmitted by *Aedes aegypti* Mosquitoes. Dengue is increasingly recognised as one of the world's emerging infectious diseases [1,5]. The word 'Dengue' was derived from 'ka-dingapepo' which means 'cramp like seizure' in Swahili [2,3]. Worldwide, 50 to 100 million Dengue infections are reported annually of which 34% is from India [6], with a fatality rate of 0.5-3.5% in Asian countries of which 90% are children <15 years of age [7]. According to data obtained from surveillance systems, the first known epidemic of Dengue-like illness in India was recorded in the year 1780 in Chennai, Tamil Nadu; whereas the first Dengue epidemic to be virologically confirmed was reported from Kolkata and the Eastern Coast of India in 1963-1964 [8]. About 16517 cases and 545 deaths were reported from India during the 1996 outbreak of Dengue, after which there has been a rise in Dengue incidence from 2010 onwards [9]. According to the National Vector Borne Disease Control Programme (NVBDCP) in 2015, 99913 cases had been reported from India which increased to 129166 cases in 2016 and reached a peak of 188401 cases in 2017. Tamil Nadu reported 23294 cases and 65 deaths due to Dengue in 2017, which represents 900 percentage spike in incidence of the disease compared to 2016 [10]. There has been rapid geographical expansion of the virus and the vector, regular epidemics and increasing occurrence of Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) in India in recent years [11].

The disease can be caused by any one of the four serotypes of the Dengue virus namely DENV-1, DENV-2, DENV-3 and DENV-4 and prior infection with one serotype provides lifelong immunity against that particular serotype, while the person is still susceptible to infection by any one of the remaining three serotypes [3,12,13]. Dengue fever is characterised by complex pathophysiological, economic as well as ecological challenges [12]. Lack of awareness among people, increased urbanisation, amplified mosquito population due to deterioration in public health infrastructure and changing climatic conditions have contributed to the increased incidence of Dengue [6]. *Aedes* mosquitoes breed in water storage drums, cement tanks, tyres, coconut shells and other such discarded containers which can hold rainwater [6]. Since there is no vaccine available for Dengue prevention in the Indian market, vector control is the ideal method to control Dengue [14]. Vector control methods can be successful only if there is community participation and for the success of community based programmes, it is important to assess the community's perception regarding the disease, its mode of transmission and breeding sites [2]. It is also known that human habits play a crucial role in the ecology and epidemiology of Dengue which further signifies the role of assessment of people's knowledge, attitude and practices regarding Dengue in integrated vector control [15]. Knowledge of the community regarding Dengue and its prevention is inadequate according to a study conducted by Varun KT et al., in Coimbatore [16]. There exists a gap between the

knowledge acquired and the application of knowledge into practices to prevent Dengue. Thus, knowledge of the community about the causes, mode of transmission, signs and symptoms and preventive measures of Dengue is of utmost importance.

Although various steps have been taken by the Government and Non-Governmental Organisations to increase awareness about Dengue, very few studies have been done in Coimbatore to determine the impact of such interventions. Thus, assessment of knowledge, attitude and practices of the community would play a very important role in guiding public administrators to plan, design and implement initiatives, programs and policies for more efficient Dengue prevention. Hence, the present study was conducted to assess the knowledge, attitude and practices regarding Dengue among the outpatients and accompanying persons attending three Primary Health Centres in Coimbatore, a city worst hit by Dengue in recent times. The present study also compares the knowledge scores between subjects based on their educational qualification in order to study the effect of education on health and disease in the community. Thus, authors wanted to study the impact of the Dengue epidemic of 2017 on people's understanding of the disease process and preventive measures to handle such epidemics in future. This study would help in setting strategies appropriate for the implementation of various community awareness programmes and health education campaigns.

MATERIALS AND METHODS

This study was a community-based cross-sectional study which was carried out among the outpatients and accompanying persons visiting three primary health care centres in Coimbatore from February to March of 2018. It was a questionnaire-based study conducted among 300 subjects. The sample size was calculated using the formula: $4pq/d^2$ from the study conducted by Sugunadevi G and Dharmaraj A, ($p=36$; $q=64$; $d=15\%$ of $p=5.4$) in Coimbatore, Tamil Nadu, India, in 2013 by consecutive sampling (non-probability sampling) [17]. Every consecutive person visiting the three primary health centres that satisfied the inclusion criteria were included in the study. The three primary health care centres involved in the study were the Singanallur, Irugur and Sarkarsamakulam primary health centres, as these were included in the field practice area of Coimbatore Medical College. Individuals aged 18-years and above of both genders, who were both outpatients and normal accompanying persons visiting three PHCs, irrespective of whether they had been affected by Dengue in the past and those who were willing to participate in the study voluntarily and had given written informed consent regarding the same were included in the study. People aged <18-years and people who were not able to understand the questionnaire were excluded from the study. The study was conducted after obtaining clearance from the Institutional Human Ethics Committee, Coimbatore Medical College, Coimbatore (Ethics approval number: 0124/2018).

The subjects were given a pre-tested questionnaire which was validated by repeated presentations and by the faculty of the Department of Community Medicine, Coimbatore Medical College, Coimbatore and was translated into the regional language (Tamil) comprising 20 questions divided into four sections: 1) Socio demographic details such as name, age, gender and educational qualification; 2) Knowledge about Dengue-15 questions; 3) Attitude towards the disease and its management-four questions; 4) Practices related to prevention of Dengue-1 question. The questionnaires were given to the subjects after explaining the purpose of the study and making it clear that their identity would not be revealed in any aspect of the study. The 15 questions on knowledge of the disease were scored from 0 to 23. All the questions had one correct option except questions 6, 8 and 9 which had multiple correct options (The maximum score for question six was 3. The maximum score for question eight was 4. Similarly, the maximum score for question

nine was 3). Each correct answer received a score of 1 and each incorrect answer, a score of 0. Subjects scoring from 0-7 were considered to have poor knowledge. Subjects scoring between 8 and 14 were considered to have average knowledge. Subjects scoring from 15-23 were considered to have good knowledge.

The study population was divided into two groups based on their educational qualification as follows: Group 1: Studied below class 10th (117 in number); Group 2: Studied above class 10th (138 in number). The two groups (subjects who had studied below class 10th and subjects who had studied above class 10th) were selected in such a way that approximately half of the subjects had studied below class 10th and the remaining half had studied above class 10th.

STATISTICAL ANALYSIS

The collected data were entered in Microsoft Excel 2007 and analysed using SPSS software version 20.0. Descriptive statistics for the collected data were recorded and comparison of mean knowledge scores between the two groups was made using independent t-test and p-value <0.05 was taken as statistically significant.

RESULTS

A total of 300 individuals were approached for participation in the study of which 255 had submitted completed questionnaires, so the response rate was 85%. The subjects in the present study were aged between 18 to 75 years with a mean age of 37.47 years. Majority of the subjects were males (61.2%). Among the 255 subjects, 117 (45.88%) had studied below class 10th and the remaining 138 (54.12%) had an educational qualification above class 10th. The demographic information of the subjects is given in the table below [Table/Fig-1].

Variables	Frequency (percentage)
Gender	
Male	156 (61.2%)
Female	99 (38.8%)
Age	
18-30 years	91 (35.7%)
31-45 years	105 (41.2%)
46-60 years	48 (18.8%)
61-75 years	11 (4.3%)
Educational qualification	
Below class 10 th	117 (45.88%)
Above class 10 th	138 (54.12%)

[Table/Fig-1]: Age, gender and educational qualification of subjects.

Knowledge of Dengue fever was assessed using 15 questions aimed at ascertaining the community's understanding of the disease process (symptoms, transmission, aetiology, vector and its breeding sites). It was observed that the majority of the study population were aware of Dengue (88.6%). It was also found that most of the subjects (80.4%) knew that Dengue was transmitted through mosquito bite. Moreover, 98% and 97.3% of subjects were aware of the breeding sites of Aedes mosquitoes inside and outside the house respectively. It was also found that knowledge of people on Dengue was lacking in several respects like signs and symptoms of Dengue (33.3%), time of the day when Aedes mosquitoes bite (34.9%) and type of water in which Aedes mosquitoes breed (40.8%). These results are depicted in [Table/Fig-2].

The mean knowledge scores were 9.71 and 10.64 for subjects who had studied below class 10th and subjects who had studied above class 10th respectively whereas the mean knowledge score overall was 10.21. There was a statistically significant difference (p -value=0.014) in knowledge scores between subjects who had studied above class 10th and those below class 10th as shown in [Table/Fig-3].

S.No	Knowledge	Below class 10 th (correct response) (%)	Above class 10 th (correct response) (%)	Overall (correct response) (%)
1	Are you fully aware of Dengue?	88.9	88.4	88.6
2	Do you know that Coimbatore is endemic for Dengue?	65	58.7	61.6
3	How is Dengue transmitted?	82.9	78.3	80.4
4	Does transmission take place through direct contact?	30.8	31.9	31.4
5	Which insect species is responsible for transmitting Dengue?	32.5	48.6	41.2
6	What are the Signs and Symptoms of Dengue?	32.5	34.1	33.3
7	At what time do Aedes mosquitoes bite?	29.1	39.9	34.9
8	What are the breeding places outside the house?	98.3	97.8	98
9	What are the breeding places inside the house?	98.3	96.4	97.3
10	In what type of water do Aedes mosquitoes breed?	33.3	47.1	40.8
11	Is blood test necessary to diagnose Dengue?	93.2	93.5	93.3
12	Does papaya leaves and Nilavembukashayam prevent Dengue?	77.8	79.7	78.8
13	Are you aware about medical helpline '104'?	52.1	56.5	54.5
14	Is recurrence of Dengue possible?	53	46.4	49.4
15	Are you aware about steps taken by Government to prevent Dengue?	32.5	40.6	36.9
Average knowledge score		9.71	10.64	10.21

[Table/Fig-2]: Response to knowledge based questions.

Groups	Mean knowledge score±SD	p-value
Below class 10 th (n=117)	9.71±3.23	0.014*
Above class 10 th (n=138)	10.64±2.70	

[Table/Fig-3]: Comparison of mean knowledge scores based on educational qualification

* = statistically significant (<0.05)

Most of the present subjects had average knowledge about Dengue namely 67.5% of subjects who had studied below class 10th and 79% of subjects with educational qualification above class 10th as shown in [Table/Fig-4].

Knowledge (score)	Below class 10 th n=117 (%)	Above class 10 th n=138 (%)	Overall n=255 (%)
Poor (0-7)	28 (23.9)	16 (11.6)	44 (17.3)
Average (8-14)	79 (67.5)	109 (79)	188 (73.7)
Good (15-23)	10 (8.6)	13 (9.4)	23 (9)

[Table/Fig-4]: Assessment of knowledge scores.

The attitude of the respondents was assessed using a set of four questions regarding source of information about Dengue, responsibility of controlling mosquito breeding, action on experiencing symptoms of Dengue and reason for the endemicity of Dengue in Coimbatore. Authors observed that the major source of information about Dengue was TV/Radio (46.15%) for subjects who had studied below class 10th. However, subjects with educational qualification above class 10th obtained information about Dengue mainly from Public Health Officer (32.5%), TV/Radio (31.2%) and Internet (26.7%). When it came to responsibility of controlling mosquito breeding, subjects who had studied below class 10th and above class 10th had the same attitude that it was the duty of the Government (52.13% and 42%

respectively) to do so. Subjects who had studied above class 10th gave more importance to individual cleanliness (52%) in controlling mosquito breeding. Both the groups had similar understanding of the need of hospitalisation for Dengue (89.74% and 91.3% respectively). Majority of the study population irrespective of their educational qualification believed that improper sanitation was responsible for Coimbatore being endemic for Dengue (72.94%). The [Table/Fig-5] depicts the responses of the subjects to questions on attitude.

Attitude towards Dengue			
Variables	Below class 10 th (%)	Above class 10 th (%)	Overall (%)
Source of information			
TV/radio	46.15	31.2	38
Newspaper	33.33	23.7	28.4
Friends/family	17.94	7.1	12.3
Internet	10.25	26.7	19.21
School/college	5.98	3.6	4.7
Public health officer	24.78	32.5	29
Others	4.27	2.1	3.14
Responsibility of controlling mosquito breeding			
Government	52.13	42	46.67
NGO	11.96	9.4	10.59
House owner	14.52	15.1	14.9
Individual cleanliness	37.6	52	45.49
Others	2.56	0	1.17
Action on getting symptoms of Dengue			
Visiting hospital immediately	89.74	91.3	90.59
Native medicine	8.54	7.2	7.84
Over the counter drugs	4.27	3.6	3.92
Wait for symptoms to subside	0	2.2	1.17
Others	0	0	0
Reason for Coimbatore being endemic for Dengue			
Improper sanitation	69.23	76.13	72.94
Inadequate medical facilities	6.83	7.88	7.45
Ignorance of general public	27.35	26.82	27.06
Overcrowding	5.12	7.3	6.27
Don't know	5.98	3.69	4.7
Others	1.7	0.75	1.17

[Table/Fig-5]: Attitude towards dengue.

The practice section of the questionnaire contained one question. Multiple preventive measures were followed by the subjects to prevent Dengue of which majority of the study population practised covering of water containers (63.92%), prevention of blockage of drains (56.86%) and disposal of stagnant water (50.98%). A smaller proportion of subjects used mosquito coils/nets (15.69%) and mosquito repellants (19.21%) to prevent Dengue. The [Table/Fig-6] shows the responses of the subjects to the question on practices followed to prevent Dengue.

Practices followed to prevent Dengue	Below class 10 th (%)	Above class 10 th (%)	Overall (%)
Mosquito coils/nets	13.67	17.28	15.69
Disposal of stagnant water	53.84	48.57	50.98
Mosquito repellants	20.51	17.9	19.21
Covering water containers	64.75	62.9	63.92
Preventing blockage of drains	51.28	60.88	56.86
Changing water in plant containers	17.09	25.23	23.35
Adding larvicide in water containers	12.82	15.31	14.12
Usage of window screens	7.69	10.9	9.41
Others	1.7	0	0.78

[Table/Fig-6]: Practices followed to prevent dengue.

DISCUSSION

Dengue fever is endemic in countries where half of the world's population reside. It was initially considered to be an urban disease, but soon the disease found its way to rural communities also, due to increased transport facilities and the spread of peri-urbanisation. The consequences of Dengue depend upon the severity of the disease with simple Dengue fever causing loss of work days and severe disease in the form of DHF and DSS causing mortality. The mortality rate is higher in rural areas where facilities for the management of DHF and DSS are still far-fetched. Social and economic factors also play a major role in shaping the epidemics of Dengue. Unplanned urbanisation and lack of resources for vector control make developing countries a haven for mosquitoes and mosquito-borne diseases [5]. Prevention of Dengue at the grass-roots level requires strong community participation and political support in the form of allocation of funds for conducting awareness programmes and health education campaigns.

The present study was a community-based cross-sectional study meant to assess the knowledge, attitude and practices regarding Dengue among adults. The present study comprised 255 subjects with 61.2% males and 38.8% females with a mean age of 37.47 years. With regard to educational qualification, 54.12% of present subjects had studied above class 10th and 45.88% had studied below class 10th.

In spite of various public awareness programmes conducted by the Government with respect to increase in Dengue in the city, 11.4% of the respondents were not aware of Dengue. In a study conducted by Itrat A et al., 10.1% of the subjects were not aware of Dengue [1]. In a study conducted by Chellaiyan VG et al., at Kancheepuram district of Tamil Nadu, only 6.3% of the subjects had not heard of Dengue [9]. A 61.6% of the present subjects knew that Dengue was endemic in Coimbatore.

Majority of the present subjects (80.4%) knew that Dengue was transmitted by mosquitoes similar to result of a study done by Valentine B et al., (90%) [2], also a study in Southern India, but only 41.2% correctly identified *Aedes* mosquitoes as the vectors responsible for transmitting Dengue which was similar to Mohapatra S and Aslami AN, (39%) and Dhimal M et al., (31%) [18,19]. Sugunadevi G and Dharmaraj A, conducted a similar study in an urban slum area in Coimbatore city in 2013 and observed that only 36% of subjects knew that Dengue was transmitted through mosquito bite [17]. Only 31.4% of the subjects knew that Dengue cannot be transmitted by direct contact similar to Dhimal M et al., (44%), showing that most of the general population still wrongly believe that Dengue is communicable by direct contact [19].

Most of the respondents in the present study could not correctly identify typical signs and symptoms of Dengue (66.7%) apart from fever, similar to Guha-Sapir D and Schimmer B, (62.6%) and Mohapatra S and Aslami AN, [5,18]. 34.9% of subjects knew that *Aedes* mosquito was a day biter, while in a study conducted by Malhotra G et al., only 4% knew that *Aedes* mosquito was a day biter [6]. This discrepancy may be due to the fact that Malhotra G et al., conducted their study among the rural and slum communities of North India, whereas this study was conducted among the general public of Coimbatore [6]. However, majority of people in the present study are still under the misconception that *Aedes* mosquitoes bite during the night (65.1%). In a study conducted by Mallika CS et al., in urban Thiruchirappali, Tamil Nadu, 23% of college students and 6% of school students knew that *Aedes* was a day-biter [20].

In the present study, 40.8% of people knew that *Aedes* mosquito breeds in clean stagnant water which was consistent with the

results obtained by Itrat A et al., (51.1%) [1]. 93.3% of subjects in the study had the correct idea that blood test is necessary to diagnose Dengue while in a study conducted by Malhotra G et al., 73.12% believe that blood test is essential to diagnose Dengue [6]. Approximately, half of the present subjects (49.4%) were still under the misbelief that once a person contracts Dengue he/she becomes immune for the rest of his/her life. Thus, the present study reveals that majority of the study population (74.9%) had relatively average knowledge about Dengue which was similar to results obtained by Mohapatra S and Aslami AN, [18]. This warrants the need for more aggressive public awareness programmes about Dengue in Coimbatore.

The mean knowledge score of subjects who had studied till class 10th was 9.71 whereas the mean knowledge score of subjects with educational qualification above class 10th was 10.64. The difference in mean knowledge scores was statistically significant with a p-value of 0.014. In a study conducted by Chellaiyan VG et al., 51.65% of subjects who had studied above class 10th were aware of the breeding sites and biting habits of *Aedes* mosquitoes; whereas only 20.34% of subjects with educational qualification below class 10th were aware of the same [9]. This difference was found to be statistically significant (p-value≤0.001) which is consistent with the present study. Itrat A et al., observed that 29.7% of subjects with education below class 10th and 70.3% of subjects with education above class 10th had average knowledge about Dengue [1]; whereas, in the present study, 67.5% of subjects with education below class 10th and 79% of subjects with education above class 10th had average knowledge about Dengue.

The source of information about Dengue was TV/Radio for 38% of the subjects which was similar to the results obtained by Binsaeed AA et al., (44.5%) and 28.4% relied on newspapers for their information similar to Matta S et al., (24.2%) [21,22]. 46.67% of the present respondents believe that the Government was responsible for controlling mosquito-borne diseases which was in concordance with the results obtained by Valentine B et al., (49%) [2]. Hospitalisation was necessary to treat Dengue according to 90.59% of our subjects which was similar to the results obtained by Valentine B et al., (81%) [2] and Tamilarasi R et al., (83.13%) [23]. 62.93% of subjects who had studied till class 10th and 76.13% of subjects with educational qualification above class 10th were under the impression that improper sanitation was responsible for Coimbatore being endemic for Dengue.

In the present study, 46.15% of subjects who had studied below class 10th and 31.2% of subjects who had studied above class 10th reported TV/radio to be their source of information regarding Dengue. However, in a study conducted by Valentine B et al., 57.9% of illiterates, 64.1% of subjects with schooling and 77.4% of graduates considered TV/radio to be their major source of information [2]. In the present study, 89.7% of subjects below class 10th and 91.3% of subjects above class 10th believed that hospital care is necessary to treat Dengue which was similar to results obtained by Valentine B et al., (57.9% of illiterates, 84.4% of subjects with schooling and 81.1% of graduates) [2].

Mosquito nets were used to prevent Dengue by 15.69% of the present subjects which was similar to the results obtained by Acharya A et al., (26.6%) and Chellaiyan VG et al., (14.7%) [7,9]. A 50.98% of the present respondents disposed of stagnant water as a means to prevent Dengue similar to the results obtained by Acharya A et al., (46.5%) [7]. Tamilarasi R et al., conducted a study in Chennai and found that 80.66% of their study population practised disposal of stagnant water to prevent Dengue [23]. A 63.92% of the present subjects had the practice of covering their water containers which was similar to the results obtained by Binsaeed AA et al., (68.6%)

[21]. Mosquito repellants were used by 19.21% of the present subjects which was consistent with the results obtained by Itrat A et al., (22.1%) [1].

In a study conducted by Valantine B et al., 63.1% of illiterates, 70.3% of subjects with schooling and 86.8% of graduates used mosquito nets to prevent Dengue [2]. In the same study, it was observed that 68.4% of illiterates, 58.6% of subjects with schooling and 67.9% of graduates used mosquito coils and repellants as a preventive measure for Dengue. This differed from the results of the present study where only 13.7% of subjects who had studied below class 10th and 17.28% of subjects with educational qualification above class 10th used mosquito nets to prevent Dengue. Similarly, a higher proportion of subjects in the study conducted by Valantine B et al., (94.7% of illiterates, 96.1% of subjects with schooling and 96.2% of graduates) had the practice of keeping their water containers covered compared to the present study (64.75% of subjects who had studied below class 10th and 62.9% of subjects with educational qualification above class 10th) [2].

A similar study done by Varun KT et al., in the fever clinic of Government Medical College and ESI Hospital among 270 subjects in Coimbatore, showed that even though majority of participants knew about Dengue (94.1%), only half of them identified symptoms correctly (53.7%) and only one third had correct knowledge of breeding habitats of *Aedes* mosquitoes (30.4%) [16]. They found that younger age group persons (<30 years) and participants with higher education were more aware of *Aedes* mosquito habits (55.7% and 81.9% respectively) and mosquito preventive measures (72.7% and 71% respectively). Their findings were consistent with the present results.

Currently, numerous programmes are being implemented by the National Vector Borne Disease Control Programme (NVBDCP) to bring awareness to the general population and for the early diagnosis and treatment of Dengue. Under NVBDCP, long-term action plan was implemented on January 2007 which includes facilities for early case management and case reporting, integrated vector management and supporting interventions. Fever alert surveillance, establishment of sentinel surveillance sites with lab support, strengthening of referral services and epidemic preparedness are some of the interventions for early case reporting and management. Integrated vector management includes larval surveys, anti-larval measures (larvivorous fish, source reduction, chemical larvicide) and anti-adult measures (indoor spraying with pyrethrum, fogging, personal protection, insecticide-treated bed nets and repellants). In addition to these, Human Resource Development, Behaviour Change Communication and inter sectoral convergence are also a part of the Long Term Action Plan [24].

LIMITATION

The study was conducted in three public health care centres in Coimbatore and therefore the study population may not be representative of the general population of Coimbatore and the baseline data collected was not complete. The present study period was one month which made it possible to conduct the study only among 300 subjects. Though the authors were able to give health education to the subjects after completion of the questionnaire, authors were not able to follow-up its impact on their knowledge of Dengue. Authors also did not perform household surveys to personally observe the preventive measures practised by the subjects. Thus, further studies with larger sample size are required to substantiate the results.

CONCLUSION

To conclude, the majority of the subjects had an average knowledge of Dengue and subjects with higher educational qualification were

found to have better knowledge about Dengue. Thus, measures to improve the community participation in Dengue prevention control and management has to be reinforced periodically through health education campaigns, mass media and creating awareness at the individual level.

REFERENCES

- [1] Itrat A, Khan A, Javid S, Kamal M, Khan H, Javed S, et al. Knowledge, awareness and practices regarding dengue fever among the adult population of dengue hit cosmopolitan. *PLoS ONE*. 2008;3(7):e2620.
- [2] Valantine B, Kumar RP, Vasudevan S, Sureshbabu J, Singh Z. Cross sectional study on knowledge, attitude and practice regarding Dengue among adult population visiting a tertiary care hospital in Puducherry, India. *Int J Community Med Public Health*. 2017;4:623-27.
- [3] Cecilia D. Current status of Dengue and chikungunya in India. *WHO South-East Asia J Public Health*. 2014;3(1):22-27.
- [4] Hairi F, Ong CH, Suhaimi A, Tsung TW, Ahmad MA, Sundaraj C, et al. A Knowledge, Attitude and Practices (KAP) study on dengue among selected rural communities in the Kuala Kangsar District. *Asia Pac J Public Health*. 2003;15(1):37-43.
- [5] Guha-Sapir D, Schimmer B. Dengue fever: new paradigms for a changing epidemiology. *Emerg Themes Epidemiol*. 2005;2:1.
- [6] Malhotra G, Yadav A, Dudeja P. Knowledge, awareness and practices regarding Dengue among rural and slum communities in North Indian city, India. *Int J Med Sci Public Health*. 2014;3:295-99.
- [7] Acharya A, Goswami K, Srinath S. Awareness about dengue syndrome and related preventive practices among residents of an urban resettlement colony of South Delhi. *J Vect Borne Dis*. 2005;42:122-27.
- [8] Gupta N, Srivastava S, Jain A, Chaturvedi UC. Dengue in India. *Indian Journal of Medical Research*. 2012;136(3):376-90.
- [9] Chellaiyan VG, Manoharan A, Ramachandran M. Knowledge and awareness towards Dengue infection and its prevention: a cross sectional study from rural area of Tamil Nadu, India. *Int J Community Med Public Health*. 2017;4:494-99.
- [10] National Vector Borne Disease Control Program. Dengue [Internet]. Delhi. National Vector Borne Disease Control Program. Available from: <http://www.nvbdc.gov.in/index4.php?lang=1&level=0&linkid=431&lid=3715> [assessed on 19/10/2018].
- [11] Syed M, Saleem T, Sayeda UR, Habib M, Zahid R. Knowledge, attitude and practices regarding dengue fever among adults of high and low socioeconomic groups. *J Pak Med Assoc*. 2010;60(3):243-47.
- [12] Singh AK, Chawla S, Chawla B, Bhagiani DK, Sharma KC. Role of a surveillance system in the management of an outbreak of dengue in the mid hills of Himachal Pradesh, India. *J Clin Diagn Res*. 2017;11(11):LC01-LC05.
- [13] Taksande A, Lakhkar B. Knowledge, Attitude and Practice (KAP) of dengue fever in the rural area of central India. *Shiraz E Med J*. 2012;13(4):146-57.
- [14] Kumaran E, Doum D, Keo V, Sokha L, Sam D, Chan V, et al. Dengue knowledge, attitude and practices and their impact on community-based vector control in rural Cambodia. *PLoS Negl Trop Dis*. 2018;12(2):e0006268.
- [15] Degallier N, Vilarinhos PT, De Carvalho MS, Knox MB, Caetano J. People's knowledge and practice about dengue, its vectors, and control means in Brasilia (DF), Brazil: its relevance with entomological factors. *Journal of the American Mosquito Control Association*. 2000;16:114-23.
- [16] Varun KT, Vijay PM, Swaminathan P, Ravikumar T. Awareness of dengue and practice of dengue control measures among urban population in Tamil Nadu, India. *Int J Community Med Public Health*. 2018;5(2):795-800.
- [17] Sugunadevi G, Dharmaraj A. An awareness program on Dengue fever among adults residing in an urban slum area, Coimbatore. *Int J Res Med Sci*. 2017;5:5242-46.
- [18] Mohapatra S, Aslami AN. Knowledge, attitude and practice regarding Dengue fever among general patients of a rural tertiary-care hospital in Sasaram, Bihar. *Int J Community Med Public Health*. 2016;3:586-91.
- [19] Dhimal M, Aryal KK, Dhimal ML, Gautam I, Singh SP, Bhusal CL, et al. Knowledge, attitude and practice regarding dengue fever among the healthy population of highland and lowland communities in central Nepal. *PLOS ONE*. 2014;9(7):e102028.
- [20] Mallika CS, Rajasekar G, Vasugi SR, Malathi P. Knowledge, attitude and practices on prevention of dengue fever among various groups of people of urban Tiruchirappalli. *Int J Pharma Res Health Sci*. 2018;6(1):2389-93.
- [21] Binsaeed AA, Sahli AA, Noureldin EM, Mohammed WS, Dafalla OM, Dahlan A, et al. Knowledge, attitudes and preventive practices of dengue fever among secondary school students in Jazan, Saudi Arabia. *Curr World Environ*. 2015;10(3):747-57.
- [22] Matta S, Bhalla S, Singh D, Rasania SK, Singh S. Knowledge, Attitude & Practice (KAP) on dengue fever: a hospital based study. *Indian J Community Med*. 2006;31(3):185-86.
- [23] Tamilarasi R, Maheshwari LS, Ahimth JA, David JA, Jeevananthan D, Naveen G, et al. A cross sectional study to assess the Knowledge, Attitude and Practice of dengue fever in urban field practice area. *Stanley Medical Journal*. 2017;4(1):8-13.
- [24] National Vector Borne Disease Control Program. Dengue [Internet]. Delhi. National Vector Borne Disease Control Program. Available from: <http://www.nvbdc.gov.in/WriteReadData/1892s/Final%20action%20plan.pdf> [assessed on 19/10/2018].

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Community Medicine, Coimbatore Medical College, Coimbatore, Tamil Nadu, India.
2. Professor and Head, Department of Community Medicine, Coimbatore Medical College, Coimbatore, Tamil Nadu, India.
3. M.B.B.S. Student, Coimbatore Medical College, Coimbatore, Tamil Nadu, India.
4. M.B.B.S. Student, Coimbatore Medical College, Coimbatore, Tamil Nadu, India.
5. M.B.B.S. Student, Coimbatore Medical College, Coimbatore, Tamil Nadu, India.
6. M.B.B.S. Student, Coimbatore Medical College, Coimbatore, Tamil Nadu, India.
7. M.B.B.S. Student, Coimbatore Medical College, Coimbatore, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. P Kalidas,
2F, Mayflower Brookefields, 62 A, Krishnaswamy Road, RS Puram, Coimbatore-641002, Tamil Nadu, India.
E-mail: prithivi2015@gmail.com

Date of Submission: **Aug 17, 2018**Date of Peer Review: **Oct 05, 2018**Date of Acceptance: **Dec 19, 2018**Date of Publishing: **Feb 01, 2019****FINANCIAL OR OTHER COMPETING INTERESTS:** None.**ANNEXURE:****Dengue-KAP Study****Section 1:****Socio demographic details:**

Name:

Age:

Sex:

Educational qualification:

Section 2:**Knowledge about dengue:**

1). Are you fully aware of Dengue?

a). Yes

b). No

2). Is Dengue common in Coimbatore?

a). Yes

b). No

c). Don't know

3). How is Dengue transmitted?

a). Through flies

b). Mosquito bite

c). Blood transfusion

d). Through water

e). Don't know

4). Can Dengue be transmitted from one person to another through respiratory secretions, bodily secretions or feces and urine?

a). Yes

b). No

c). Don't know

5). Is any of the following insect types responsible for transmitting Dengue? If yes, then which type? If no, select the option no.

a). Aedes

b). Anopheles

c). Culex

d). No

6). What are the signs and symptoms of Dengue? (can choose multiple options).

a). Fever

b). Eye pain

c). Itching/rash

d). Don't know

7). If Dengue is transmitted through insect/mosquito bite then at what time does it bite? If no, then choose the option no:

a). Day-time

b). Night-time

c). Any time

d). Don't know

e). No

8). What are the breeding places of the causative agent outside the house? (can choose multiple options):

a). Leaves

b). Tyres

c). Wooden logs

d). Garbage

9). What are the indoor breeding places of the causative agent?

a). Stagnant water

b). Water tanks

c). Flowerpots

d). Dustbins

10). Does the causative agent of Dengue breed in water. If yes, then in what type of water does it breed? If no, choose the option 'no'?

a). Stagnant clean water

b). Running clean water

c). Polluted water

d). Don't know

e). No

11). Is blood test necessary to diagnose Dengue?

a). Yes

b). No

c). Don't know

12). Does papaya leaf saaru and Nilavembukashayam prevent Dengue?

a). Yes

b). No

c). Don't know

13). Are you aware of the medical helpline number '104'?:

a). Yes

b). No

14). If a person has suffered from Dengue, is it possible for him/her to be infected again?

a). Yes

b). No

c). Don't know

15). Are you aware of the various measures taken by the Government to prevent Dengue?

a). Yes

b). No

Section 3:**Attitude towards Dengue:**

1). What is your source of information for knowing about Dengue and similar diseases? (can choose multiple options).

- a). Television/radio
- b). Newspaper
- c). Friends/relatives
- d). Internet
- e). School/College
- f). Public health officer

2). Who do you think is/are responsible for controlling and preventing Dengue? (can choose multiple options).

- a). Government
- b). Non-Governmental Organization
- c). House owner
- d). Individual responsibility

3). What will you do if you get signs/symptoms of Dengue fever? (can choose multiple options).

- a). Immediately go to the hospital
- b). Use native medicine
- c). Get medicines from the pharmacy directly
- d). Wait till the symptoms subside
- e). Others

4). Is Dengue very common in Coimbatore? If yes, then what do you think is the reason behind it? If no, choose the option 'no'. (can choose multiple options).

- a). Poor sanitation
- b). Inadequate health services
- c). Ignorance of public
- d). Overcrowding
- e). Don't know
- f). Others
- g). No

Section 4:**Practices to prevent Dengue:**

1). What practices do you follow to prevent Dengue? (can choose multiple options).

- a). Use mosquito coils/nets
- b). Dispose stagnant water
- c). Use mosquito repellants
- d). Cover water containers
- e). Prevent blockage of drains
- f). Change water in water containers
- g). Adding larvicide in water containers
- h). Use window screens
- i). Others