

Knowledge regarding dengue and its prevention in Morang district of Nepal

Abstract

This cross-sectional study was carried out in Purbanchal University teaching hospital outpatient department among 175 respondents to assess the level of knowledge and awareness in dengue prevention. Nearly 53% of the respondents were aged ≤ 40 years. Similarly, more than half (61.7%) of the respondents were male. The mean score of knowledge was 5.41 ± 3.41 regarding dengue fever and 5.29 ± 3.34 regarding dengue prevention. More than half of the respondents had correct knowledge regarding the breeding season, common presentation, source of transmission and susceptibility of dengue fever however, very few knew about the drug of choice, route of transmission and specific symptoms like skin-rash, muscle pain, etc. It was also interesting to note that people were more aware regarding basic ways to prevent dengue like using mosquito bed nets, reducing source of stagnant water, using mosquito repellents, etc. than some modern techniques like window screening. Even though dengue is an epidemic people seem to have lower than average knowledge regarding its prevention hence, sufficient informational and educational materials must be made available to the public and community centers where maximum people can get it for enhancement of their knowledge on dengue and improve the good practice on dengue prevention.

Keywords: knowledge, awareness, dengue, prevention, Nepal, Morang

Volume 8 Issue 3 - 2023

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Received: October 02, 2023 | **Published:** October 31, 2023

Abbreviations: DF, dengue fever; DHF, dengue hemorrhagic fever; WHO, world health organization; DENV, dengue fever virus; CDCP, centers for disease control and prevention, OPD, out-patient department; PUTH, purbanchal university teaching hospital; SPSS, statistical packages for the social sciences; NPR, nepalese rupee; SD, standard deviation; cOR, crude odds ratio, aOR, adjusted odds ratio; CI, confidence interval, USA, united states of America

Introduction

Dengue is a vector borne disease caused by two species of mosquitoes namely, *Aedes Aegyptus* (principal vector) and *Aedes albopictus* mostly seen in the tropical and subtropical areas.¹ There are four distinct serotypes of dengue virus 1-4 within the genus *Flavi virus* which are responsible for two main forms of the disease, dengue fever (DF) and severe dengue.² The clinical manifestations of the infection may include asymptomatic infection, mild flu-like symptoms, and the more severe cases in which patients may further deteriorate, developing hypothermia and circulatory shock, a condition known as dengue shock syndrome.³⁻⁵ It is highly fatal if not treated in time with about less than five percent reduction in the risk if treated appropriately.⁶ Dengue Hemorrhagic Fever (DHF), results in around 24,000 deaths annually worldwide and over half of the world's population resides in areas potentially at risk for dengue transmission.⁷ World Health Organization (WHO) declares dengue and DHF to be endemic in the Asian sub-continent however, it is endemic in 112 countries of the world.⁸ Due to the lack of vaccine, treatment for dengue heavily relies on supportive therapy; hence great emphasis is placed on its control and preventive measures.^{9,10} Globally, nearly 50 million people are infected each year by dengue fever (DF).¹¹ Since the last 10-15 years, the geographical distribution of DF has increased to virgin countries especially rural areas, being the most rapidly escalating viral disease globally.¹² There were no reported cases of DF until 2004 in Nepal however, many outbreaks were recorded since 2006.¹³ The southern lowlands of Nepal during the post-monsoon period provide a climate with elevated levels of rainfall and temperature that is favorable for breeding of the vector

mosquitoes.^{14,15} During the first outbreak in 2010 in the Terai region, 96% of cases were reported from three districts only namely, Chitwan, Nawalparasi, and Rupandehi. A total of 183 confirmed dengue cases were reported from Nepal in 2017.¹⁵ Dengue, caused by Dengue fever virus (DENV) transmitted by mosquito (*Aedes aegypti*) bite affecting all age groups, is the most rapidly spreading febrile disease presenting with symptoms- fever, severe headache, myalgia, joint pain, and rash. Earlier four different serotypes of DENV were believed to be culprit; however, isolation of its fifth variant DENV-5 in 2013 has emerged as a new threat for control program of DF.^{2,16} The vector is usually found in man-made containers like flower vases, water storage jars, unused toilet bowls, etc. It is daytime feeder with peak incidence in dawn and before dusk. The dengue virus has got 4 serotypes.¹³ Infection with one serotype gives lifelong immunity against reinfection by same serotype but not against other serotypes. So, one can have disease several times during their lifetime.¹⁷

According to the World Health Report 1996, the "re-emergence of infectious diseases is warning that progress achieved so far towards global security in health and prosperity may be wasted". Risk factors associated with DF/DHF are demographic and societal changes like unplanned and uncontrolled urbanization, severe constraints on civic amenities particularly water supply and solid waste disposal, insufficient and inadequate water distribution, insufficient waste collection and management, lack of mosquito control infrastructure, introduction of non-biodegradable plastic products, paper cups, used tyres, etc.^{18,19} Similarly, the increased air travel and globalization of trade has significantly contributed to the introduction of all the DENV serotypes to most population centers of the world. The use of the most powerful molecular tools has revealed that each serotype has developed many genotypes as a result of microevolution. There is increasing evidence that virulent strains are replacing the existing non-virulent strains.

The World Health Organization and Centers for Disease Control and Prevention (CDCP) recommends extensive community educational campaigns that emphasize reducing vector breeding sites

as an effective way of dengue prevention.¹² This recommendation is supported by various researches showing that community education can be more effective in reducing dengue vector breeding sites than chemicals alone. Several studies suggest that better knowledge of dengue among people was one of the predictors of better practices of dengue prevention and studies on knowledge and awareness of people from different sector of the community is very crucial for the development of prevention and control policies of Dengue.²⁰⁻²² Hence, this study aims at exploring the level of knowledge regarding dengue and its preventive measures among the patients visiting the outpatient department (OPD) of a teaching hospital in Nepal and identify the factors associated with it.

Material and methods

Study design

A quantitative cross-sectional study was conducted to assess the level of knowledge and awareness regarding dengue among patients attending OPD of Purbanchal University Teaching Hospital (PUTH) at Gothgaun, Morang district located in Koshi province of Nepal.

Study population and setting

All the patients attending the OPD of PUTH aged 15 years or above who provided written consent to participate in the study were included in the survey. We excluded differently abled patients (blind, deaf, fractured arm, etc.) and those with active severe physical or mental health conditions like patients with psychosis, dementia, severe pain, etc. PUTH is a tertiary hospital with different specialty OPDs with about 300 patients visiting the OPD every day and is in the Koshi province: eastern part of Nepal and is one of the dengue endemic areas of the country. Data collection technique and tools. A structured questionnaire was developed after in-depth literature review and was translated into Nepali language by the native speaker BB. The questionnaire contained three items focusing on: demographic profile of the participants like their age, sex, educational status, income status, etc. followed by some knowledge related variables on Dengue Fever and awareness related variables on Dengue Prevention. We conducted purposive sampling to obtain data from those visiting the OPD of PUTH until we reached a desired sample size. Participants were provided with a self-administered questionnaire after obtaining a consent for participation.

Data analysis

Descriptive statistics like frequency, mean, Median, standard deviation, proportion, etc. was used to identify the demographic characteristics of the participants. Binary logistics regression analysis was used to see the association between dependent and outcomes variables. The Statistical Package for the Social Sciences (SPSS) version 20 was used for data coding and analysis.

Sample size

The sample was determined by using the following formula.

$$N = Z_{\alpha}^2 * pq / d^2$$

Where, n = required sample size

Z = the standard normal deviation set at 1.96 which corresponds to the 95% confidence interval.

p= proportion of the level of knowledge regarding Dengue Fever = 0.13(17)

$$q = (1-p) = 0.87$$

d= margin of error allowed in the study = 0.05

α = level of significance at 5%

Results

The sample obtained for this study was 175 and among them more than half of the participants were aged ≤40 years. Similarly, more than half about 61.7% of the respondents were male and majority of respondents (84%) were Hindus. About 38.3% respondents were living in nuclear family, whereas the major occupation reported was homemaker (41.7%) followed by farming (31.4%). Similarly, less than one third of the respondents were illiterate with below 35% making up to high school or university level education. Regarding family income, 16% of the respondent's family income was below 10,000 Nepalese Rupee (NPR) which is equivalent to 76.14 United States Dollar per month as of 18th July 2023. The mean score of knowledge was 5.41 ± 3.41 regarding dengue fever and 5.29 ± 3.34 regarding dengue prevention Table 1.

Table 1 Sociodemographic characteristics of the study participants (n = 175)

	Frequency	Percentage
Age (in years)		
≤40	92	52.6
>40	83	47.4
Gender		
Male	108	61.7
Female	67	38.3
Religion		
Hindu	147	84
Non-Hindus	28	16
Type of Family		
Nuclear	67	38.3
Joint or extended	108	61.7
Occupation		
Service	21	12
Business	16	9.1
Farmer	55	31.4
House maker	73	41.7
Students	10	5.7
Education		
Illiterate	52	29.7
Primary	47	26.9
Secondary	31	17.7
Higher Education	28	16.1
University	17	9.7
Income in NPR		
Below 10000	28	16
10001-20000	54	30.9
20,001-30,000	48	27.4
Above 30,000	45	25.7
Knowledge regarding dengue fever, mean (SD)	5.41 (3.4)	
Less than average	86	49.1
More than average	89	50.9
Knowledge regarding dengue prevention, mean (SD)	5.29 (3.3)	
Less than average	75	42.9
More than average	100	57.1

About 41% of the respondents has knowledge regarding the vector causing dengue and more than half of respondents (68%) knew that the main source of dengue's mosquito breeding was stagnant water. 76.6% knew that dengue epidemic starts during hot weather. 72% respondents identified chills and high fever as the common presentation of dengue fever whereas, only 30.9% respondents identified muscle pain and skin rashes as the symptoms of dengue fever. Less than one third (28%) of the respondents agreed that the dengue causing mosquito, bites in the morning and 14.3% respondents knew that paracetamol is the drug of choice for dengue fever. We also identified that more than 50% of the respondents didn't know about the choice of drug for treatment of DF, symptoms of DF and mode of transmission of DF at all.

Figure 1 illustrates the percentage of knowledge regarding dengue fever in X-axis and the statements related to the knowledge of dengue fever. The color blue indicates that the participants responded "Yes" to the statement, orange indicates "No" and gray indicates "Doesn't know". Similarly, among 175 respondents nearly 78% respondents mentioned that mosquito bed nets prevent dengue and more than 50% identified that getting rid of stagnant water and maintaining clean water resources reduces mosquito breeding and prevents dengue. Only 18.3% of respondents identified mosquito coils/liquids/vaporizers to reduce mosquitoes and about 55% of respondents were not aware that the window screening will prevent dengue.

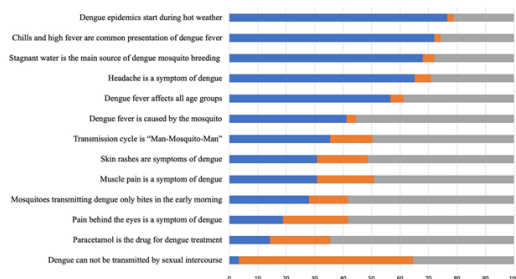


Figure 1 Proportion of knowledge related to dengue fever.

Figure 2 illustrates the percentage of knowledge of prevention regarding dengue fever in X-axis and the statements related to the knowledge of preventive measures of dengue fever. The color blue indicates that the participants responded "Yes" to the statement, orange indicates "No" and gray indicates "Doesn't know".

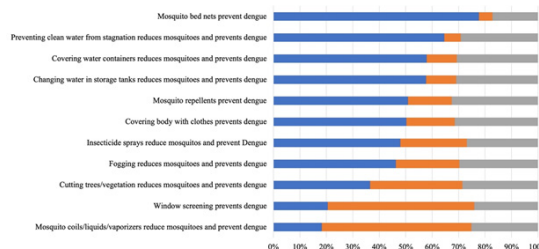


Figure 2 Proportion of knowledge related to dengue prevention.

The multivariable logistic regression analysis showed that age, education, and occupation had significant effect on knowledge on dengue fever and age and education alone had significant effect on knowledge regarding dengue prevention after adjusting all other variables under analysis. There was a significantly lower chance of having more than average level of knowledge on dengue and level of awareness on dengue prevention among participants of >40 years of age compared to the participants of ≤40 years of age [aOR = 0.14, 95% CI = (0.06 - 0.35), p-value<0.001] and [aOR = 0.15, 95% CI = (0.06-0.38), p-value<0.001] respectively. Similarly, the likelihood of having more than average level of knowledge on DF was 4.8 times [aOR = 4.79, 95% CI = (1.75 - 13.07), p-value<0.01] and on dengue prevention was 4.7 times [aOR = 4.79, 95% CI = (1.94-11.46), p-value<0.01] among those who have more than secondary level of education compared to their counterparts. There was significantly lower chance of having more than average level of knowledge on DF among participants engaged in other occupation compared to the farmers [aOR = 0.15, 95% CI = (0.05-0.47), p-value<0.01] Table 2.

Table 2 Logistic regression model to identify factors associated with knowledge regarding DF and dengue prevention (N = 175)

	Knowledge on dengue fever		Knowledge on dengue prevention	
	cOR (95% CI)	aOR (95% CI)	cOR (95% CI)	aOR (95% CI)
Age group (in years)				
≤40	1	1	1	1
>40	0.07 (0.03 - 0.15) ***	0.14 (0.06 - 0.35) ***	0.1 (0.05 - 0.20) ***	0.15 (0.06 - 0.38) ***
Gender				
Male	1	1	1	1
Female	0.74 (0.40 - 1.37)	1.8 (0.68 - 4.73)	0.66 (0.35 - 1.21)	1.12 (0.48 - 2.64)
Education				
≤secondary education	1	1	1	1
>secondary education	8.41 (3.49 - 20.27) ***	4.79 (1.75 - 13.07) **	4.12 (1.84 - 9.25) **	4.71 (1.94 - 11.46) **
Occupation				
Farmers	1	1	1	1
Others	8.67 (3.97 - 18.96) ***	0.15 (0.05 - 0.47) **	9.85 (4.62 - 21.01) ***	0.83 (0.30 - 2.29)

Table 2 Continued...

	Knowledge on dengue fever		Knowledge on dengue prevention	
	cOR (95% CI)	aOR (95% CI)	cOR (95% CI)	aOR (95% CI)
Religion				
Hindus	1	1	1	1
Non-Hindus	0.26 (0.11 - 0.66) **	1.97 (0.62 - 6.32)	0.84 (0.37 - 1.89)	0.72 (0.23 - 2.20)
Income (in NPR)				
≤20000	1	1	1	1
>20000	3.68 (1.97 - 6.87) ***	2.26 (0.96 - 5.32)	3.45 (1.84 - 6.46) ***	2.21 (0.99 - 4.95)

cOR: crude Odds Ratio, aOR: adjusted Odds Ratio, CI: confidence interval, NPR: Nepalese Rupee.

Discussion

This study identified the level of knowledge on dengue fever and its prevention among Nepalese residing in Morang district of Nepal. We identified that maximum Nepalese have lesser than average knowledge on dengue fever and its prevention even though many recognized the vector, transmission method and symptoms related to DF.

A study conducted by Carmen Arellano et al, observed that the study population had enough knowledge regarding the vector causing dengue.²³ The Dengue Bulletin in January 2014 showed above half of respondents to have a good level of knowledge on dengue fever which was consistent with our study findings.¹⁹ Similarly, the level of knowledge obtained in this study are consistent with some of the south-east and south Asian countries like India, Bangladesh, Indonesia, Pakistan, Malaysia, etc.^{21,24-26} However, the knowledge regarding dengue fever and its prevention being just above the average might not be adequate when it comes to containing the transmission specially when the population we studied belonged to one of the dengue endemic areas. Thus, it is important to identify the group of population who are vulnerable to dengue transmission to effectively implement health policies for dengue prevention and control.²⁷

It was interesting to note that our participants were familiar with the mosquito breeding environment and maximum recognized stagnant water as a source of mosquito breeding. This might have been due to the community sensitization programs or media exposures via television and radios and the awareness campaigns conducted by Nepal government and the local organizations.²⁸ However, participants didn't have much idea about window screening, they were also not familiar with some important symptoms of the dengue fever. The knowledge of the symptoms will help to identify dengue fever and seek medical attention in time. People from low middle income countries tend to have delayed health seeking behavior leading to worse health outcomes.²⁹ Thus, conducting awareness campaigns to help people understand the sign and symptoms of dengue fever is quite important.

We also identified that people more than 40 years had higher knowledge on dengue fever and its prevention than their counterparts after adjusting for all covariates. Similarly, it was evident that higher education was a preventive factor for increase in knowledge level among our participants which is coherent with other studies as well.²⁸ Hence, it might be important to include dengue prevention in health curriculums so that people could learn it from the schools for a sustainable and effective prevention strategy. It was also evident that farmers had lower knowledge than other professionals. The major

occupation of people residing in the study area is farming hence, it is important to provide health education to them on dengue prevention so that they can control the mosquito breeding areas. Furthermore, people with higher income might have adequate access to the mosquito repellents, bed nets, education, etc. leading to higher knowledge among them regarding dengue fever and its prevention. This disparity needs to be addressed by reducing the cost of mosquito repellents in the endemic areas or distributing free bed nets for the people with lower socio-economic status. Community could organize weekly environment sanitation programs or other sustainable programs to keep the surrounding clean and destroy the mosquito breeding areas.³⁰

Limitations

Even though this study identified the level of knowledge on various aspects of DF and its prevention there are some limitations to this. At first, the sample was collected from only one hospital of the Morang district hence, it might not be generalizable to the provincial level however, PUTH is one the tertiary hospital of the province which is well equipped and receives patients with dengue for the treatment. Secondly, we didn't obtained information on the housing standard and environmental sanitation of the respondents which might have affected our results for the adjusted models. Lastly, we didn't collect information on the past exposure to the dengue fever among our participants which might have influenced their level of knowledge.

Conclusion

Dengue is a mosquito-borne infection that has emerged as major public health issue. Majority of respondents had moderate level of knowledge on dengue, and more than half of respondents had moderate level of awareness on dengue prevention, this escalating health issue is becoming most common disease affecting regions like Nepal. Sufficient Informational and educational materials must be made available to the public and community centers where maximum people can get it for enhancement of their knowledge on dengue and improve the good practice on dengue prevention.

Acknowledgments

The authors express their sincere gratitude to Purbanchal University for providing with the opportunity to conduct this study. A deep appreciation to the research committee members of Purbanchal University for their necessary suggestions and encouragement to carry out this study. A special thanks to the director, Purbanchal University Teaching Hospital for supporting our research activity in the hospital. Authors express heartfelt thanks to all respondents for their active participation and co-operation during the time of data collection.

Finally, the authors would like to extend their gratitude to all well-wishers. The statements made here are solely the responsibility of the authors.

Author contributions

Conceptualization BB; Methodology BB, AKB; Validation BB; Formal analysis BB, AKB; Investigation BB; Resources BB, AKB; Data curation BB, AKB; Writing - original draft preparation BB, AKB; Writing - review and editing BB, AKB; Visualization BB; Supervision AKB; Project administration BB, AKB. All authors have read and approved the final manuscript.

Declarations

Ethical approval and consent to participate

This study got ethical approval from the Ethical Review Board of Purbanchal University. We also obtained written informed consent from the participants after the disclosure of the objectives, research methodology, data sharing and utilization policy of this research, anticipated risks, burdens and benefits and institutional affiliations of the researcher for this study. All methods were performed in accordance with relevant guidelines and regulations.

Consent for publication

Not applicable

Availability of data and materials

The questionnaire used in this study has been provided as a supplementary file (Supplementary file 1). And the data sets could be obtained from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

Funding

The authors received fund from faculty research grant under the Purbanchal University Research Division.

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