

Knowledge and Preventive Practices Regarding Dengue Fever among Medical Undergraduates in Teaching Hospital in Nepal: A Descriptive Cross-sectional Study

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ABSTRACT

Introduction: Dengue Fever (DF) is a significant public health concern in Nepal, and medical undergraduates play a crucial role in disease prevention and control. This study aimed to assess the knowledge and preventive practices regarding DF among medical undergraduates at KIST Medical College and Teaching Hospital in Nepal.

Methods: A descriptive cross-sectional study was conducted among 249 medical undergraduate students, comprising 43.8% males and 56.2% females. Data were collected using a structured questionnaire, assessing participants' knowledge of Dengue symptoms, transmission, and preventive practices. The data were analyzed using SPSS version 25.

Results: Most participants correctly identified Dengue fever as a viral disease transmitted by Aedes mosquitoes (81.9%) and knew that the main cause of transmission is human to mosquito contact (96.4%). However, only 18.1% were aware of all four antigenic subtypes of Dengue prevalent in Nepal. Regarding preventive practices, 98.8% acknowledged that Dengue is preventable, and a significant proportion adopted measures such as using mosquito bed nets (95.2%) and seeking timely medical attention when symptomatic (95.6%).

Conclusions: The study reveals that medical undergraduates at KIST Medical College and Teaching Hospital have good knowledge and positive preventive practices towards Dengue fever. However, knowledge gaps exist, particularly regarding Dengue subtypes and breeding sites. Health education programs are crucial to address these gaps and enhance preventive practices, empowering medical students to become effective advocates for Dengue control in Nepal.

Keywords: Dengue fever; Knowledge; Medical undergraduates; Nepal; Preventive practices.

INTRODUCTION

Worldwide approximately 400 million cases and 22,000 deaths occur due to DF each year.¹ The first DF case in Nepal was reported in 2004.² Nepal had four Dengue outbreaks since 2006, featuring DENV-1 in 2010 and DENV-2 in 2013 with the first endogenous outbreak in the Chitwan district.³

The higher burden of Dengue in Nepal's Terai region was

worsened by factors such as the open border with India, limited medical facilities, insufficient mosquito control, and conducive climatic conditions for vector expansion.³ Climate change along with rapid landscape changes shifted disease vectors, causing tropical to temperate transmission in Nepal.⁴

This study fills research gaps on DF awareness and prevention among medical students, crucial for effective control programs, exploring awareness, and influencing

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behavior change to mitigate transmission.⁵ Also, students can play a vital role in translating DF knowledge into preventive practices, acting as a hub for community preparedness.

METHODS

This descriptive cross-sectional study was conducted among undergraduate medical students from the 1st and 2nd years at KIST Medical College and Teaching Hospital. The study was carried out between February and March 2023.

The inclusion criteria for this study comprise individuals who provide consent and express a willingness to participate in the research. Additionally, participants must be currently enrolled in the first and second years of MBBS and BDS Programs. It is essential that they complete the provided questionnaire within the stipulated time frame. On the contrary, the exclusion criteria encompass those who decline to participate or withhold their consent. Individuals who have successfully completed the first and second year of MBBS and BDS programs are also excluded. Furthermore, participants must be exclusively affiliated with KIST Medical College and Teaching Hospital, as those from other institutions are not considered within the scope of this study. These criteria aim to ensure a focused and relevant participant pool for the research objectives.

A total of 249 students enrolled in MBBS and BDS programs (109 Male and 140 Female students, Mean age 20.21± 1.17 years) participated in the study after providing written informed consent.

The sample size was calculated as below applying the probability Proportional to the size (PPS) sampling method.

MBBS=510 students

BDS= 180 students

Total= 690 students

Using the following formula for the calculation of sample size,

$$\begin{aligned} \text{Sample size } n_0 &= \frac{z^2 pq}{d^2} \\ &= \frac{1.96^2 * 0.5 * 0.5}{0.05^2} \\ &= 384 \text{ students} \end{aligned}$$

For finite proportion, using the following formula,

$$\begin{aligned} \text{Finite proportion} &= \frac{n_0}{1 + \frac{n_0 - 1}{N}} \\ &= \frac{384}{1 + \frac{383}{690}} \\ &= 247.7 \sim 248 \end{aligned}$$

Now, applying the Probability Proportional to Size (PPS) sampling method,

$$\text{MBBS} = 510/690 * 100 = 73.91\%$$

$$\text{Required sample of MBBS students} = 73.91\% * 248 = 183.29 \sim 184 \text{ students}$$

$$\text{BDS} = 180/690 * 100 = 26.08\%$$

$$\text{Required sample of BDS students} = 26.08\% * 248 = 64.67 \sim 65 \text{ students}$$

Hence the required sample size for our study is 184+65= 249 students

The probability proportional to the size sampling method was applied.

Data for the study was collected through a self-administered questionnaire, filled out by participants after receiving a thorough explanation and addressing any queries. The questionnaire, designed with a structured format, aimed to evaluate the knowledge and preventive practices related to DF among medical undergraduates. It included sections for gathering sociodemographic information and assessing participants' knowledge and preventive practices concerning DF.

To ensure accuracy, all questions were coded, and rigorous checks were implemented to verify the completeness of the data collection process. The study focused on dependent variables related to parameters assessing Knowledge and Preventive Practices regarding Dengue Fever. Independent variables included various socioeconomic and demographic characteristics such as age, sex, religion, ethnicity, and nationality.

Knowledge-related inquiries covered diverse aspects, including the causative agent of DF, the mosquito responsible, main breeding sites, usual biting periods, the season when transmission rates increase significantly, symptoms, sources of information about DF, and prevalent antigenic subtypes in Nepal. The assessment of Preventive Practices involved parameters such as awareness of Dengue as a preventable disease, use of preventive measures, application of mosquito repellent creams, coverage of water containers, and frequent cutting down of bushes in the vicinity. Each correct response was assigned a score of 1, while incorrect answers received a score of 0 respectively.

The study received ethical approval from the Institutional Review Committee of KIST Medical College and Teaching Hospital under the reference number IRC Ref No. 2079/80/71. The questionnaire employed in the study was structured into three segments. The initial section gathered demographic information from participants, the second section comprised questions aimed at assessing participants' knowledge, and the third section included inquiries on practices for Dengue Fever prevention. Data input and analysis were performed using SPSS version 25, with results presented through frequency and percentage distributions, represented in tables and Pie charts as appropriate. The mean knowledge score, accompanied by the standard deviation, was calculated

at 9.59± 1.75.

RESULTS

Table 1, presents the knowledge of undergraduate medical students at KIST Medical College and teaching hospital regarding DF. The majority of participants (81.9%) correctly identified that Dengue fever is caused by a virus, and 85.1% knew that the Aedes mosquito is the disease vector. Surprisingly, only 18.1% of participants were aware that all four antigenic subtypes of Dengue (DENV 1, 2, 3, and 4) are prevalent in Nepal. Encouragingly, 96.4% of participants knew that the main cause of Dengue transmission is human to mosquito contact. However, less than half (41.8%) correctly stated that stagnant clean water is the main breeding site for the Dengue vector. Around 67.9% of participants believed they could recognize the vector mosquito causing Dengue. Regarding the usual biting period of vector mosquitoes, 67.1% of participants correctly identified early morning and late evening. Furthermore, 76.3% correctly recognized that the rate of Dengue transmission increases mostly during the rainy season. Almost all participants (97.6%) considered Dengue a serious disease, and 84.3% were aware that no special drugs are available for its treatment. The mean knowledge score of undergraduate medical students regarding Dengue fever was 9.59±1.75, with scores ranging from 3 to 14.

Table 1. Correct response to the questions assessing knowledge regarding Dengue fever (N=249)

S. N.	Parameters with the correct response	n (%)
1	Causative agent of Dengue fever	
	Virus	204 (81.9)
2	Mosquito responsible for transmitting Dengue	
	Aedes	212 (85.1)
3	Antigenic subtype of Dengue prevalent in Nepal	
	DENV1,DENV2,DENV3,DENV4	45 (18.1)
4	Main cause of Dengue transmission	
	Human-to-mosquito contact	240 (96.4)
5	Main breeding site for vector of Dengue	
	Stagnant clean water	104 (41.8)
6	Can the vector mosquito causing Dengue fever be recognized in your vicinity	
	Yes	169 (67.9)
7	Usual biting period of vector mosquitoes causing Dengue	
	Early morning and late evening	167 (67.1)
8	The season during which the rate of transmission of Dengue fever increases mostly	
	Rainy season	190 (76.3)
9	Dengue is a serious disease	
	Yes	243 (97.6)

S. N.	Parameters with the correct response	n (%)
10	There are special drugs available for the treatment of Dengue	
	No	210 (84.3)
	Mean score of Knowledge	
	Mean ± SD, min , max= 9.59± 1.75,3,14	
	Below mean score	121 (48.6)
	Above mean score	128 (51.4)

Table 2, presents the participants' responses regarding important symptoms of DF in the study. Among the 249 participants, a significant majority of 223 (89.6%) believed that prolonged high fever and 172 (69.1%) believed that muscular pain is a crucial symptom of DF. A moderate number of participants, 90 (36.1%), and 87 (34.9%) respectively, considered nausea and vomiting, and retro orbital pain as the main symptoms. However, a minority of 44 (17.7%) participants believed that diarrhea is one of the important symptoms of DF.

Table 2. Knowledge about important symptoms of Dengue fever (N=249)

S. N.	Symptoms	Yes (%)	No (%)
1	Prolonged high fever	223(89.6)	26(10.4)
2	Nausea and vomiting	90(36.1)	159(63.9)
3	Diarrhea	44(17.7)	205(82.3)
4	Retro orbital pain	87(34.9)	162(65.1)
5	Muscular pain	172(69.1)	77(30.9)

The main sources of information regarding DF among medical undergraduates were assessed. Social media was the most prevalent source, with 63.10% of participants obtaining information from this platform. Books and articles were the second most common source, accounting for 29.30% of responses. Television was cited as the source by 6.80% of participants, while only 0.80% mentioned radio as their information source. (Figure 1)

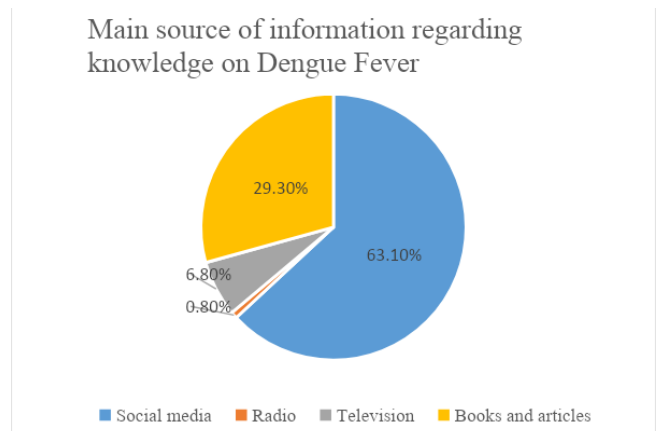


Figure 1. Main source of information regarding knowledge on Dengue Fever

Table 3, illustrates the pattern of preventive practices

related to DF among the 249 participants. The majority, 246 (98.8%), acknowledged that Dengue is a preventable disease. A significant proportion, 237 (95.2%), reported adopting preventive measures like using aerosol/liquid or mosquito bed nets around their houses. During college hours, 89 (35.7%) participants used mosquito repellent cream as a preventive practice. Regarding water storage, 242 (97.2%) respondents mentioned properly covering water containers, while 211 (84.7%) ensured clear plant pots with frequent water changes, and 85.1% regularly cut down bushes around their houses. When symptoms were visible, 238 (95.6%) participants visited the hospital for testing and treatment. Additionally, 200 (80.3%) followed the latest information from trusted sources. Overall, the study participants demonstrated a good level of preventive practices towards DF, reflecting their awareness and proactive approach to Dengue prevention and control.

Table 3. Pattern of preventive practices towards Dengue fever (N=249)

S. N.	Parameter	Yes (%)	No (%)
1	Dengue is a preventable disease	246(98.8)	3(1.2)
2	Use of aerosol/liquid or mosquito bed net at your house	237(95.2)	12(4.8)
3	Use mosquito repellent cream during your college hours	89(35.7)	160(64.3)
4	Water containers used for water storage are properly covered	242(97.2)	7(2.8)
5	Plant pots are kept clear and water is changed frequently	211(84.7)	38(15.3)
6	Bushes around the house are cut down frequently	212(85.1)	37(14.9)
7	Visit the hospital for tests and treatment when symptoms are visible	238(95.6)	11(4.4)
8	Following the latest information from trusted sources	200(80.3)	49(19.7)

The study population consisted of 249 medical undergraduate students, with 43.8% being males and 56.2% females. The majority (77.1%) belonged to the age group ≥ 20 years, while 22.9% were less than 20 years old, with an average age of 20.21 ± 1.17 years. Most of the students followed Hinduism (90.4%), followed by Upper caste ethnicity (59%), and the least were Christians (1.2%). Nepalese students constituted the highest proportion (96.4%) of participants, with 189 MBBS students and 60 BDS students. Among them, 138 were in the 1st academic year, and 111 were in the 2nd academic year, making a total of 249 participants. The

above-mentioned results are well depicted in Table 4.

Table 4. Socio-demographic pattern of the study population (N=249)

Characteristics	n (%)
Sex	
Male	109 (43.8)
Female	140 (56.2)
Age (yrs)	
<20	57 (22.9)
≥ 20	192 (77.1)
Mean 20.21, SD 1.17	
Religion	
Hindu	225 (90.4)
Buddhist	14 (5.6)
Christian	3 (1.2)
Muslim	7 (2.8)
Ethnicity	
Dalit	8 (3.2)
Janajati	18 (7.2)
Madhesi	69 (27.7)
Muslim	7 (2.8)
Upper caste	147 (59)
Nationality	
Nepali	240 (96.4)
Others	9 (3.6)
Stream	
MBBS	189 (75.9)
BDS	60 (24.1)
Academic Year	
1st year	138 (55.4)
2nd year	111 (44.6)

DISCUSSION

The study assessed medical undergraduate students' knowledge and preventive practices regarding DF in a teaching hospital in Nepal. The findings highlighted diverse socio demographic patterns among the participants. Regarding gender distribution, the study showed a slightly higher proportion of females (56.2%) compared to males (43.8%). This finding aligns with a study conducted among university students in Bangladesh⁶ and Lahore, Pakistan⁷ which also reported a higher number of female participants. This trend could be attributed to the increasing enrollment of female students in medical education globally.

The majority of participants (81.9%) correctly identified that Dengue fever is caused by a virus whereas it was comparatively low (35%) in a study done in Johor.⁸ This knowledge is essential as it highlights the fundamental understanding that Dengue is a viral disease and

not caused by bacteria or other pathogens. Medical students must have this awareness, as it forms the basis for appropriate diagnosis, treatment, and prevention strategies for the disease.

It is encouraging to see that 85.1% of participants correctly knew that the *Aedes* mosquito is the disease vector for Dengue. This indicates a good understanding of the transmission mechanism among medical students, which is crucial for disease prevention and control. Similarly, a study conducted in Janakpur⁹ and another study among university students in Azad Kashmir by Atif et al. reported a high level of awareness regarding *Aedes* mosquitoes as the vector for DF.¹⁰

However, the study found that only 18.1% of participants were aware of all four antigenic subtypes of Dengue (DENV 1, 2, 3, and 4) prevalent in Nepal. This highlights a knowledge gap about the different Dengue virus subtypes circulating in the country. To enhance disease management and control strategies, medical students must be aware of the multiple Dengue virus serotypes and their potential impact on disease severity and outbreaks.

Another positive finding was that 96.4% of participants correctly knew that the main cause of Dengue transmission is human to mosquito contact. This awareness is critical as it highlights the importance of personal protective measures to prevent mosquito bites and subsequent transmission of the virus. Similarly, studies conducted in other countries, such as the study by Anita et al, also reported a high level of awareness regarding human-to-mosquito transmission of Dengue.¹¹

However, only 41.8% of participants correctly stated that stagnant clean water is the main breeding site for the Dengue vector. This finding is consistent with a study conducted in Pakistan by Rafaqat et al.¹² This indicates a knowledge gap about the most common breeding sites for *Aedes* mosquitoes. Improper disposal of water containers and stagnant water in and around households serve as ideal breeding grounds for these mosquitoes. Medical students need to be well-informed about the breeding sites to effectively guide the community in vector control measures.

The study found that 67.9% of participants believed they could recognize the vector mosquito causing Dengue. However, practical training and education on mosquito identification are essential to ensure accurate identification and effective vector control measures. Regarding the usual biting period of vector mosquitoes, 67.1% of participants correctly identified early morning and late evening as the peak biting times. This awareness is essential for individuals to take appropriate protective measures during these times when mosquitoes are most active. Similar studies have reported similar knowledge levels regarding the peak biting times of *Aedes* mosquitoes.¹³

Furthermore, 76.3% of participants correctly recognized

that the rate of Dengue transmission increases mostly during the rainy season whereas in contrast to this only 35% agreed with this in a study done in Chitwan Nepal.¹⁴ This aligns with the typical pattern of Dengue outbreaks associated with increased mosquito activity during the rainy season. Medical students must be aware of this seasonal variation to enhance preparedness and response efforts during periods of heightened transmission.

Almost all participants (97.6%) considered Dengue a serious disease which coincides with the finding shown by a study done in Malaysia.¹⁵ In contrast to this, only 59% of the participants agreed with it in a study done in Nepal.¹⁶ This understanding is essential, as it reflects the gravity of the disease and its potential impact on public health. Recognizing Dengue as a serious health threat can motivate medical students to actively participate in preventive and control measures.

Additionally, 84.3% of participants were aware that no special drugs are available for the treatment of Dengue which correlates with the findings done by Khusbu et al.⁹ This highlights the absence of specific antiviral medications for Dengue and underscores the importance of supportive care in managing Dengue cases.

The mean knowledge score of undergraduate medical students regarding Dengue fever was 9.59 ± 1.75 , indicating a relatively high level of knowledge. However, the range of scores (3 to 14) suggests variability among individual participants. Targeted educational interventions are needed to address specific knowledge gaps and enhance overall awareness about Dengue among medical students.

The majority of the participants recognized prolonged high fever (89.6%) and muscular pain (69.1%) as crucial symptoms of DF. These findings align with studies conducted in Nepal and globally, which have consistently identified these symptoms as common manifestations of DF among different populations.^{9, 17} The recognition of prolonged high fever as a significant symptom is crucial since it is one of the hallmark features of Dengue fever and can help in early detection and prompt management of cases. Similarly, the identification of muscular pain as an important symptom is vital since it is a characteristic symptom of DF and can help differentiate it from other febrile illnesses.

The findings regarding the main sources of information regarding DF among medical undergraduates are crucial in understanding how students access and perceive information related to the disease. In this study, social media emerged as the most prevalent source, with 63.10% of participants obtaining information from this platform which aligns with a similar study done by Wan Rosalina et al in Malaysia.¹⁸ This high prevalence of social media usage aligns with the growing trend of digital communication and information sharing among

the younger generation, including medical students.

While social media has become a prominent source of health information, books and articles were the second most common source cited by 29.30% of participants in the present study. However this finding is in contrast to the study done in Chitwan where maximum students used books for acquiring information on DF.¹⁹ This reflects the continued significance of traditional print materials in acquiring knowledge, especially among academic communities such as medical students. Books and scientific articles are regarded as authoritative sources of information, providing in-depth knowledge and evidence-based practices. This finding suggests that medical students value academic literature in their quest for accurate and reliable information about DF.

Regarding preventive practices, the majority of participants (98.8%) acknowledged that Dengue is a preventable disease, 95.2% reported adopting preventive measures by using aerosol/liquid or mosquito bed nets around their houses, a significant number of participants (97.2%) mentioned properly covering water containers, and 84.7% ensured clear plant pots with frequent water changes. Furthermore, 85.1% of participants regularly cut down bushes around their houses. When symptoms were visible, 95.6% of participants visited the hospital for testing and treatment. These practices are beneficial in reducing potential mosquito breeding sites and limiting the exposure of residents to mosquito bites. This high level of awareness about the preventability of Dengue is crucial as it lays the foundation for the implementation of preventive measures. Similar findings have been reported in other studies conducted in Nepal and globally.^{9,10,13}

The study's limitation lies in its singular institutional focus, potentially restricting the generalizability of its findings to the broader population.

CONCLUSIONS

The study provides valuable insights into knowledge and preventive practices regarding DF among medical undergraduate students at KIST Medical College and Teaching Hospital in Nepal. Health education programs are essential to address knowledge gaps and further enhance preventive practices among medical students, contributing to Dengue control efforts in Nepal and beyond.

ACKNOWLEDGMENT

The authors would like to thank KIST Medical College and Teaching hospital. We would like to appreciate the enthusiastic participation of medical and dental students, for their active participation.

CONFLICT OF INTEREST:

None

FUNDING

This study was funded with the authors' own contributions.

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