ORIGINAL ARTICLE

Dengue Fever Perception and Knowledge for Endemicity Control among University Students of Karachi

Farhan Muhammad Qureshi[1*], Samira Faiz Bari[1], Saima Masood Wazir[1], Masood Wazir[1], Sehrish Zehra[1], Ayesha Khalid[2]

ABSTRACT

Objective: To determine the knowledge and the risk perception regarding dengue fever among the educated population along with their behaviors towards prevention in the backdrop of rising cases of dengue at the national level.

Study Design: Cross-sectional study.

Place and Duration of Study: The study was carried out at the Departments of Electrical, Software Engineering, Computer Sciences and Geophysics of Bahria University, Karachi Campus, Pakistan, from October 2021 to March 2022.

Methods: With an observational analytical study design, 333 students were recruited through convenient sampling. Data were collected using a structured questionnaire. The socio-demographic traits and general information about dengue fever spread and prevention were presented in frequencies and percentages while dengue fever knowledge, risk perception, and behavior of respondents were compared using a chi-square test with the significance level set at 0.05.

Results: It was found that 79.8% of the students recognized that transmission of dengue is through mosquitoes, whereas only 17.4% identified the correct species of dengue infection. Twenty-two percent knew that dengue is a viral illness. Sixty-eight percent marked contaminated water as a mosquito breeding site, while 52.8% believed it to be trash/garbage. Eighty-nine, sixty-nine and fifty-two percent reported the use of window screens, bed nets/mesh, and insect repellents as protective measures, respectively. Fifty-seven percent of participants considered dengue a fatal illness. Eighty-eight and seventy-five percent recognized dengue as a preventable and curable disease, respectively.

Conclusion: Educated participants in this study were misapprehensive that they had satisfactory knowledge, risk perception, and behavior toward dengue fever. Very few had the correct knowledge regarding transmission mode and spread and protective and preventive strategies. Information regarding transmission mode and spread, as well as protective and preventive strategies, were insufficient.

Keywords: *Dengue, Dengue Fever, Dengue Virus, Dengue Shock Syndrome, Knowledge.*

[1]Department of Community Medicine
Karachi Institute of Medical Sciences (KIMS),
Karachi, Pakistan
[2]Department of Community Medicine
Liaquat National Hospital, Karachi, Pakistan
Correspondence:
Dr. Farhan Muhammad Qureshi
Associate Professor, Community Medicine
Karachi Institute of Medical Sciences (KIMS),
Karachi, Pakistan
E-mail: drfarhanqureshi@hotmail.com

Introduction

Incidence and dengue fever outbreaks are mainly contingent on individuals' behavior related to knowledge and adoption of preventive measures. Behavior is shaped by a person's perceived risk. However, the uncertainty often remains towards the actual risk of infection. Dengue fever (DF) is a mosquito-borne viral infection of humans caused by any of the four serotypes of the dengue virus.[1] Currently, dengue fever is endemic in 112 countries

with the highest risk of disease transmission and epidemics.[2] DF vectors are the two main species of female mosquitoes named Aedes Aegypti and Aedes Albopictus, responsible for carrying and transmitting the virus, usually during day hours.[3] World Health Organization (WHO) stated three forms of dengue infection: mild dengue fever and the two major severe forms, Dengue hemorrhagic fever (DHF) and Dengue shock syndrome [DSS].[4]

In terms of morbidity and mortality, DF is now recognized as a serious, rapidly expanding public health problem of great significance across the globe.[5] The WHO estimates that around 50 million of the world's population gets infected with the dengue virus, and 400 thousand are affected by Dengue hemorrhagic fever on an annual basis.[6] Presently, DF is prevalent in Southeast Asia and the Western Pacific region and is considered a hotspot for vector-borne infectious diseases, with approximately three-quarters of all DF cases worldwide.[2,6] Research revealed that approximately 20 million people were affected by DF, 2 million suffered from severe disease, and 21 thousand individuals died living in high-risk geographical areas.[6,7]

DF has been a rapidly spreading viral infection in Pakistan since 1994 after the first case ever detected in Karachi.[3] Outbreaks of the disease in 2009 from the province of Khyber Pakhtunkhwa (KPK) and in the year 2011 from Lahore, Punjab.[4,8] Afterwards, dengue fever outbreak of hemorrhagic type and its related morbidity and mortality increases substantially with frequency and severity all over Pakistan.[8] Various reasons have been considered for the spread of virus transmission leading to significant morbidity and mortality rapid population growth, unplanned urbanization, climate change, poor water and sanitary management, and unsatisfactory mosquito control programs, etc.[9,10] However, neglectful health behavior such as lack of understanding of authentic knowledge, careless negative attitude, and improper procedures may upsurge the disease burden.[2,10]

Although DF is prevalent in Pakistan, no documented evidence that has shown assessing understanding or perception regarding dengue infection and its preventive strategies among the educated population is available, for which non-medical university-level students of Karachi City were chosen. Since definitive treatment is unavailable, this study assists in seeing if preventive behavior is affected by risk perception while considering the basic knowledge of ailment and education. Therefore, the main objective of the current study is to determine the knowledge and risk perception regarding dengue fever among the educated population along with their behaviors towards prevention in the backdrop of rising cases of dengue at the national level.

Methods

This multi-institutional study followed a quantitative research design with observational analytical methods using a cross-sectional approach to determine the knowledge, perception of DF, and behavior toward its prevention. The study was carried out at the Department of Electrical, Software Engineering, Computer Sciences and Geophysics of Bahria University, Karachi Campus, Pakistan was taken as a proxy of the educated population of Karachi, Pakistan, from October 2021 to March 2022 after obtaining permission from institutional review committee of Karachi Institute of Medical Sciences (KIMS), Karachi, Pakistan held on 16th February 2021 vide letter no: 004/ERC/RC/2021. Participants were recruited through convenience sampling. The study's target population was various academic disciplines, excluding healthcare sciences, irrespective of age and gender. Data was collected using a structured questionnaire developed after conducting an extensive literature review and had three main sections. The first section was based on socio-demographic traits, and the second and third sections included questions about knowledge, risk perception, and behavior toward the preventive measure of dengue infection.

Ethical approval was obtained from the institution's review board before the study. The sample size was calculated using the Open Epi online sample size calculator. The understanding level of dengue infection among university-level students was taken as 69 %[2], with a 95% confidence level and 5% precision; the calculated sample size was 329, which was inflated to 333. Participants were interviewed after informed consent.

Statistical Analysis

SPSS version 23.0 was used to enter and analyze data. The socio- demographic traits and general information about dengue fever spread and prevention were presented in frequencies and percentages while opinions about dengue fever knowledge, risk perception and behavior of respondents were compared using chi-square test with the significance level set at 0.05.

Results

Table 1 presents the socio-demographic and academic information of participating university students. Fifty-seven percent of the 333 study participants were males. The students had an average age range of 18-37 years. Most of the students were enrolled in bachelor's (36.9%) and master's (32.4%) programs at various universities. In the case of study disciplines, students were from diversified fields. The majority (76%) of the students were unmarried, 13.8% were full-time students, and 56.7% were unemployed.

Table 2 summarizes the relevant knowledge and awareness about dengue infection in participants. The majority (79.8%) of the participating students

Table 1: Socio-demographic traits of study participants (n=333)			
Variable			**n (%)**
Gender	Male		189 (56.7)
	Female		144 (43.2)
Age Group	18 - 22		112 (33.6)
	23 – 27		178 (53.4)
	28 – 32		36 (10.8)
	33 – 37		7 (2.1)
Enrolled Program (Course)	Certificate		10 (3)
	Diploma		76 (22.8)
	Bachelors		123 (36.93)
	Masters		108 (32.4)
	Doctoral		16 (4.8)
Study Discipline	Arts		58 (17.4)
	Business Studies		71 (21.3)
	Engineering		118 (35.4)
	Commerce		86 (25.8)
Type of University	Public Sector		92 (27.6)
	Private Sector		241 (72.3)
Marital Status	Unmarried		255 (76)
	Married		69 (20.7)
	Divorce		6 (1.8)
	Widowed		3 (0.9)
Religion	Islam		278 (83.4)
	Hindu		161 (4.8)
	Christian		39 (11.7)
Employment Status	Employed	Full-Time	46 (13.8)
		Part-Time	98 (29.4)
	Unemployed		189 (56.7)

reported that the illness is transmitted through mosquitoes, but only 17.4% knew the correct species that spread dengue infection. Almost one third, 36.6% of the subjects did not know about the causative organism, while 22.8% knew that dengue infection is caused by a virus. Regarding mosquito breeding sites, the majority (68.4%) marked contaminated water, followed by trash/garbage (52.8%) and ponds or swamps (49.2%). Thirty-four percent of participants believed that dengue spreading mosquito bites during nighttime. A diversity of answers was given by participants

regarding protective measures against mosquito bites; however, the use of window screens (89.1%), bed nets/mesh (69.3%), and insect bites. However, the use of window screens (89.1%), bed nets/mesh (69.3%), and insect repellent (51.9%) are the most

reported protective measures adopted by the participants.

Out of total participant students, 43.2%, 36%, 24.3% and 23.4% participants recognized severe headache, muscular and joint pain, nausea/vomiting and skin

Table 2: Knowledge of Dengue Fever : (n=333)

Variable		n (%)
Mode of Transmission	Contact with infected patients	26 (7.8)
	Consume unhygienic food/water	14 (4.2)
	Transmitted by houseflies	12 (3.6)
	Transmitted by ticks	10 (3.0)
	Transmitted by mosquitoes	266 (79.8)
	Blood transfusion	5 (1.5)
Type of Mosquito	Aedes Aegypti	58 (17.4)
	Anopheles	131 (39.3)
	Culex	77 (23.1)
	Other	27 (8.1)
	Don't Know	40 (12.01)
Causative organism	Virus	76 (22.8)
	Bacteria	110 (33.0)
	Parasite	25 (7.5)
	Don't Know	122 (36.6)
*Mosquito breeding sites	Contaminated water	228 (68.4)
	Standing water	54 (16.2)
	Clean water	93 (27.9)
	Trash/Garbage	176 (52.8)
	Wet/muddy pots or vessels	49 (14.7)
	Ponds and swamps	164 (49.2)
	Discarded tyres or utensils	78 (23.4)
Protective measures *	Spraying insecticides/pesticides	140 (42.0)
	Bed nets/mesh	231 (69.3)
	Insect repellents (cream, lotion, etc.)	173 (51.9)
	Repellent equipment (Coil, electrical device)	138 (41.4)
	Cover water tanks or containers	108 (32.4)
	Proper disposal of garbage	136 (40.8)
	Window screens	297 (89.1)
	Wear long protective clothes	149 (44.7)
	Remove stagnant water	192 (57.6)
Mosquito bite pattern	Morning	74 (22.2)
	Afternoon	39 (11.7)
	Evening	89 (26.7)
	Night	114 (34.2)
	Don't Know	17 (5.1)

rash respectively, as the major signs and symptoms to be presented in dengue affected individual. (Figure 1)

In this study, the internet (62.7%), television/radio (51.6%), newspaper/magazines (48.9%), and
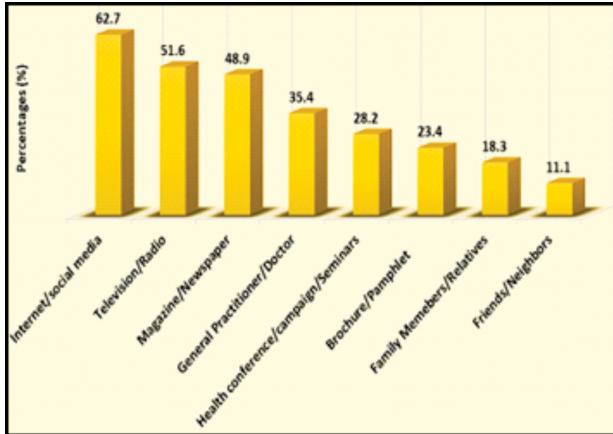

Fig 1: Common Sign/Symptoms of Dengue Infection (%)
***Participants were allowed to opt more than one option**

healthcare professionals (35.4%) were the major sources of information on dengue infection among participants. However, 11.1% of the participants received information from friends and neighbors.

(Figure 2)

Overall DF knowledge was judged on the basis of information regarding "mode of transmission, type
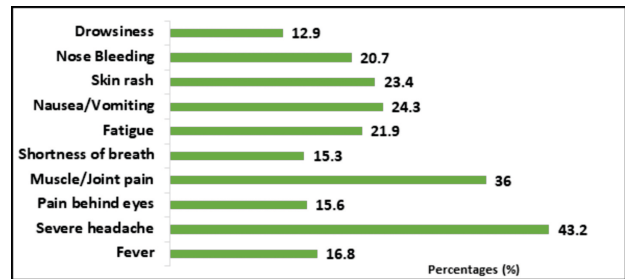

Fig 2: Source of Information on Dengue Infection (%)

of mosquito, causative organism, breeding sites and mosquito bite pattern". The difference in overall knowledge was significantly different (p-value <0.001), as 61.2% of participants had correct knowledge. Concerning dengue risk perception, it was observed that 57.4% of the participants considered dengue a fatal illness, both for children and adults. Nonetheless, 87.9% and 75.4% considered dengue a preventable and curable disease, respectively. Furthermore, 71.4% perceived a risk of getting a dengue infection in the near future. Based on these risk perceptions 70.8% of the

Table 3: Dengue fever risk perception, and behavior			
	Variable	**n (%)**	**P-value**
DF awareness (Overall)	Yes	204 (61.2)	<0.001
	No	129 (38.7)	
	Risk Perception		
Preventable Disease	Yes	293 (87.9)	
	No	31 (9.3)	<0.001
	Not Sure	9 (2.7)	
Curable Disease	Yes	251 (75.4)	
	No	34 (10.2)	<0.001
	Not Sure	42 (12.6)	
Fatal Disease	Yes	191 (57.4)	
	No	54 (16.2)	0.001
	Not Sure	86 (25.8)	
Risk of getting DF	Yes	238 (71.4)	
	No	56 (16.8)	< 0.001
	Not Sure	39 (11.7)	
Risk Perception & Behaviour (Overall)			
Risk Perception	Satisfactory	236 (70.8)	0.001
	Unsatisfactory	97 (29.1)	
Behavior	Satisfactory	152 (45.6)	0.016
	Unsatisfactory	181 (54.3)	

participants' perception was found to be satisfactory, while 29.1% was not (*p*-value 0.001). Similarly, regarding opinions about overall behavior toward the prevention of the illness, those who adopted at least 5 preventive measures among the given options were marked as satisfactory behavior (45.6%), which was also significantly different among participants (*p*-value 0.001). (Table 3).

Discussion

Understanding and risk perception regarding dengue infection among educated people plays an important role in disease prevention. Prevention remains the main strategy for controlling dengue due to the unavailability of definitive treatment and vaccine. Therefore, the current study comprises of non-medical university level students of Karachi to represent the educated population of the city. Amongst 333, more than half of the university students were between the age of 23 to 27 years and the majority were engineers followed by commerce and business students. However, about 20% of the participants did not even know about DF transmission mode. The results were consistent with a recent study done in KPK province where 72.3% of participants knew that DF is caused by mosquito bite but contradicts in the educational status of the respondents as majority (35%) had no formal education.[11] Another study conducted among health care professionals in the Malakand division of Pakistan stated that viruses (22%), parasites (8.3%), and bacteria (7.5%) were the causative organisms of DF.[12] These findings were comparable with our non-medical participants. Several environmental factors are responsible for the dengue fever endemicity, such as warm temperature, rainfall, sanitation, and so on.[13] Peak mosquito diversity and species richness were observed in the months of August and September in Lahore because of high temperature and rainfall.[14] Moreover, urbanization, construction and industrial work has provided ample mosquito breeding areas.[14] Incidence of Dengue infection increases in the rainy season due to the abundance of mosquito breeding sites, especially tires, stagnant water in streets, room coolers, and urban trash as well.[13,15] The study participants were not very sure about the breeding sites as only 27.9% of the participants took clean water as a mosquito breeding place, followed by standing water, i.e., 16%. Most of them (68.4%) realized that contaminated water was the source of mosquito multiplication. Nonetheless, the responses deemed to the protective measures against the disease were analogous. The greater part was determined to focus on personal protection, like the use of window screens, bed nets and mosquito repellents, and insecticides, while they were less focused on primary prevention, that was covering water tanks and containers, proper disposal of garbage, and removal of stagnant water. In contrast to these findings, a study reported that more than half of their participants knew that spreading dengue fever can be reduced by removing or cleaning stagnant water.[11] Regarding the mosquito bite pattern, more than 60% stated night and evening being the peak time, which is somewhat related to the previous studies showing around 63% of mosquito bites are experienced at night time and 77% at sundown.[11,12]

In 2021, research conducted in a rural area of Islamabad reported that fever was the most common symptom (100%), followed by headache, joint pain, and myalgia.[16] Nevertheless, 43.2% of our respondents took headache and only 16.8% recognized fever as the main symptom during dengue infection. According to their understanding, patients with dengue infection usually suffer from muscle and joint pain, nausea and vomiting, skin rash, and weakness. The main sources of information on dengue infection were found to be the internet and social media (62.7%), though mainstream media (51.6%) and print media (48.9%) were yet other ways. Several other studies also found electronic and print media to be the most common source of information about the ailment.[17,18] To get insight into the risk perception and behavior towards dengue infection, we found that most of our subjects claimed that they had some knowledge about the disease. A good percentage said that dengue fever is preventable, curable and there is always a risk of getting the disease while more than half of them thought that the disease is fatal. However, most of the respondents perceived that they had satisfactory knowledge and that their risk perception and behavior toward the disease is also satisfactory. Education is the fundamental tool that steers a

country's social and economic infrastructure through knowledge, expertise, awareness of basic human rights, social enlightenment, lifestyle up-gradation, and the creation of a healthy environment. Therefore, our study's strength is that it focuses on university students to observe their understanding and perception towards a health-related issue. However, a comparative study would produce the most generalizable results that could be conducted in the future.

Conclusion

Educated participants in this study had a misconception that they had satisfactory knowledge, risk perception, and behavior toward dengue fever. They knew that the ailment is preventable and curable, plus there is always a risk of acquiring the infection; however, information regarding transmission mode and spread, as well as protective and preventive strategies, were insufficient.

Recommendations

Being the educated ones, the students must have accurate and up-to-date information about the risk and prevention of the endemic disease. There is a dire need to improve the perspective through regular educational programs, seminars and campaigns inside institutes sensitizing students to adopt preemptive measures and educate others.

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Authors Contribution

FMQ: Idea conception, study designing, data collection, data analysis, results and interpretation, manuscript writing and proof reading

SFB: Data collection, data analysis, results and interpretation, manuscript writing and proof reading

SMW: Data collection, manuscript writing and proof reading

MW: Data collection, manuscript writing and proof reading

SZ: Data collection, data analysis, results and interpretation, manuscript writing and proof reading

SS: Data collection, manuscript writing and proof reading

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