Dengue Fever: A Statistical Analysis Regarding Awareness about Dengue among University Students in Azad Kashmir

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Abstract

Background: Dengue fever, a mosquito-borne disease that occurs in tropical and subtropical areas of the world, is considered to be a significant threat for the mankind in both developing and developed countries. WHO recommends the best way to prevent dengue endemic is to provide knowledge about dengue and preventive measures to people. Despite the efforts to prevent dengue virus, recent national survey data indicates that prevalence of dengue among population is still on the rise.

Objective: To assess the knowledge of university students about dengue and preventive measures, to know association of awareness about dengue determinants of knowledge of dengue infection in students of University of Azad Jammu and Kashmir.

Methods: Quantitative method was used to get meaningful detailed information. The sample was selected by using random sampling technique. For the present study, sample of 365 students of University of Azad Jammu and Kashmir was taken to explore the research objectives through pre-designed interview schedule. Knowledge of dengue fever and the use of preventive measures were measured by means of structured questionnaire. Differences in knowledge of dengue fever and the use of preventive measures between risk groups were calculated by chi-square test and logistic regression were used for identification of determinant of knowledge.

Results: The study found that students had good knowledge about dengue. Of 365 of students, 97% student had knowledge of dengue and 67.7% had awareness about its mode of transmission. In multivariate analyses, knowledge of dengue significantly differed by age, sex, and region (P<0.05) the students with age above 25 knew more about dengue than the others Odds Ratio (OR) of 3.076 for the age group above 25 compared with people age group 15-20. In comparison with reference group, knowledge of dengue was significantly higher among females students (OR: 2.222), but lower among male students.

Conclusion: In conclusion, the majority of the study population had good knowledge of dengue but the students with qualification group intermediate and graduate had relatively little knowledge of dengue. Therefore, these groups need special attention in future health education programmes. Students with knowledge of the disease more frequently reported the use of preventive measures than the others. In addition, this study recommends a concerted effort by all the stakeholders to increase knowledge of people about dengue which can in turn decrease the risk of dengue infection.

Keywords: Dengue virus; Awareness; University students; Azad Kashmir

Introduction

Dengue is a disease of many tropic and subtropics regions that can occur epidemically; caused by dengue virus, a member of the family Flaviviride. Dengue is transmitted in humans by two species of *Aedes* mosquitoes namely, *Aedes aegypti* and *Aedes albopictus*. There are four distinct serotypes of dengue virus which can all cause a spectrum of disease, ranging from asymptomatic infection to the most severe form of the disease Dengue Hemorrhagic Fever (DHF). The symptoms of dengue infection are high fever, severe headache, painful joints and muscles, vomiting, nausea, pain behind the eyes and skin rashes. These symptoms almost last for about one week, but weakness and tiredness may last for several weeks. In some patient's dengue fever leads to development of DHF and the patient may reflect problems including blood in the urine or stool, bleeding gums or bloody nose. These symptoms may lead to death if untreated [1].

Dengue fever, also known as break bone fever, is an infectious mosquito-borne disease which is caused by the dengue virus and occurs in tropical and subtropical areas of the world. The dengue virus belongs to the Flaviviridae family of viruses that cause diseases in human. Dengue is a self-limiting disease that clears up by it usually within a couple of weeks. The incubation period for dengue is five to eight days [2]. Researchers are working on dengue fever vaccines, but the best prevention for now is to reduce mosquito habitat in areas where dengue fever is common [3].

Hyperendemicity is the most common risk factor associated with the emergence of DHF, also becoming a major cause of hospitalization and death among children in several countries. Dengue can affect anyone but people having compromised immune systems are at higher risk of dengue infection. It is possible to get dengue fever multiple times because dengue virus has four different serotypes. Infection with one serotype confers long-term immunity to that serotype but not to the others; therefore individuals may be infected up to four times. When a mosquito bites a dengue infected person the virus enters the mosquito and when it bites another person, the virus enters that person's bloodstream [4] and the most fatal complication of dengue is when bleeding started from nose, gums and inside body which can lead to Dengue Shock Syndrome (DSS), a serious complication of DHF that can lead to hypotension. Consequently, sudden death of infected person can occur [5].

Millions of cases of dengue infection occur worldwide every year. Dengue fever is the most common in Southeast Asia and the western Pacific islands, but increasing rapidly in Latin America and the Caribbean. Dengue fever is a major infectious disease threat in tropical and subtropical areas, accounting for an estimated 2.5 billion people at risk of infection and more than 100 million cases, with at least 15,000 deaths annually [6].

Dengue's become a public health concern owing to its detrimental effects on the health of people. Though debates regarding awareness of people regarding dengue fever continue to concern researchers, more recently academic research has shown concern about accessing knowledge of people regarding causes, signs and symptoms, mode of transmission and preventive measures of dengue. Several studies recommend that better knowledge of dengue leads to better prevention techniques adopted by people to prevent dengue. It is reported that people having high level of knowledge regarding dengue, use better prevention practices in order to avoid dengue [7,8]. Begonia et al. [9], conducted a study to know knowledge of people about dengue fever. They found that 61.45 percent people had good knowledge about causes and preventive measures regarding dengue. More than half of the respondents used dengue preventive measures such as fans, mosquito coil, and bed nets to avoid mosquitoes while only about one third utilized insecticides sprays, screen windows and a little portion used professional pest control. Findings suggest that better knowledge does not necessarily lead to better practice of dengue measures [10].

Situation in Pakistan

In Pakistan dengue fever was first reported in Karachi in 1994 [11]. After that dengue endemic is spreading in Pakistan at faster rate due to varied contributing factors including overpopulation, urbanization which in turn leads to lack of proper water management, lack of effective dengue control programs and international travel and trade. National Guidelines for Dengue Vector Control in Pakistan [12] revealed that from 1995 to 2004 only 699 cases of dengue were reported from three districts of Pakistan.

A sudden rise in cases of dengue fever was witnessed in year 2005 in Karachi. During the year 2010 16,580 cases of dengue fever and 257 deaths were reported in Lahore and about 5000 survivors of dengue fever whereas 60 deaths were reported from rest of the areas of Pakistan. In 2013, 6376 cases of dengue fever and 23 deaths were reported from Swat, Pakistan [13].

Despite the efforts to control spread of dengue virus, recent national survey data indicates that prevalence of dengue among population is still on the rise and there is a high mortality rate due to dengue fever in Pakistan. This is evident that by providing knowledge about dengue and preventive measures to people dengue infection can be avoided. There is a dire need to aware people about dengue virus in order to knock back this epidemic. That's way awareness campaigns are launched all over the world including Pakistan to aware people about dengue virus. The main purpose of this research was to check the level of awareness about dengue among university student in Azad Kashmir. It is much important to aware everyone because any one's irresponsibility can give chance to grow dengue mosquito, which can eventually effect the whole area. There are very few studies aimed at assessing the level of awareness regarding dengue fever in Pakistan although such information is necessary for better interventions to control dengue. Notably, in Azad Kashmir study concerning this issue is never carried out before. Keeping in view the importance and research gap on the problem the present study was designed in order to check level of awareness of people regarding dengue and preventive measures.

Methodology

A cross sectional descriptive as well as inferential study was conducted. A sample of 365 students was collected from University of Azad Jammu and Kashmir. The research process was initiated in January 2016 and completed in June 2016. A close ended structured questionnaire was distributed randomly to the students. Bivariate analysis of categorical variables was done by the chi-square test. The phi-values were calculated to determine the type of association i.e., positive or negative. Through logistic regression analysis OR was also calculated for categorical variables. The dengue is taken as dichotomous dependent variable. Data was analyzed by using SPSS version 16.

Results and Discussion

As discussed earlier that sample size of 365 students were selected for the current study. In order to check the association of awareness of dengue with different variables the chi-square test was applied. Results showed that some of the variables are strongly associated with awareness of dengue and some of them have not shown association with awareness of dengue and that have p-value>0.05 the level of significance. And the remaining variables showed high association with awareness of dengue that is each of these have p-value <0.05 the level of significance **(Table 1)**.

Table 2 shows that 44.9% students were male whereas 55.1% students were female. Students were divided into four groups according to age categories. First category was from the age group of 15-20 years, 24.9% students were from this category. Second category was from the age group of 20-25 years, 54.5% were from this age group. Third category was from the age group of above 25 years and 20.5% respondents belong to third category. On the basis of educational attainments there were four categories. First category was intermediate 8.5% respondents belong to this category. Second category is graduation and 14.5% were graduates. Third category was masters, 59.5% respondents fall in this category. Fourth category was above masters and 17.8% respondents were from this category. As for residence, 56.7% belonged to rural areas while only 43.3% were from urban areas.

Table 1 Results of chi-square test for association of awareness of dengue with different variables.

Variables	Chi-square value	p-value
Gender* awareness of dengue	3.541	0.040
Age of respondent*awareness of dengue	6.252	0.030
Qualification of respondent* awareness of dengue	6.404	0.040
Residence of respondent*awareness of dengue	32.315	0.000
Dengue breeds* awareness of dengue	12.111	0.007
Disease transmitted by dengue*awareness of dengue	19.897	0.000
Is dengue preventable*awareness of dengue	6.882	0.009
Indoor protective measure to avoid		
Dengue*awareness of dengue	8.621	0.003

Results reveal that 97.0% respondents have heard about dengue and 3.0% respondents haven't heard about dengue before. Similar results (98%) were reported in the study conducted in Srilanka [14]. Regarding the awareness about breeding site of dengue, 47.4% respondents reported that dengue breeds in clean water. Findings regarding breeding site of dengue are similar with study of Zameer et al. [15], and Itrat et al. [11], conducted in Pakistan. As for the dengue vector, 89.0% respondents were of the opinion that the vector for dengue is mosquito. Results of another study conducted in Pakistan by Qadir et al. [16], are consistent with results of our study. About the timing of biting, 59.2% said that dengue mosquito bites in the morning, 9.9% said at night, 18.1% said that it bites at afternoon and 12.8% respondent did not know about the time of biting of dengue mosquito. Concerning transmission of disease by dengue, 15.1% respondents reported that dengue fever is transmitted by dengue, 12.6% said that malaria, and 67.7% said dengue fever while 4.7% respondents did not know that which disease is transmitted by dengue. Results indicate that 44% respondents know that high fever is symptom of dengue.

Results show that 4.4% respondents told that dengue is transmitted by flies, 53.2% said that by mosquito, 34.5% said that by *Aedes* mosquito and 7.9% said that dengue is transmitted by all types of mosquito. Result indicated that least number of the respondents which is 28.5% know that the most life threatening sign of dengue is bleeding. Interestingly, 24.9% respondents said that the after effect of dengue fever is fever, 23.6% said joint pain, and 11.5% responded skin rashes and 40.9% said death. 57.5% said that the carrier of dengue fever is *Aedes* mosquito, 13.2% said its carrier is Flavivirus and 29.3% told that all types of mosquito is carrier of dengue fever.

It is apparent that majority of the respondents know why children are more vulnerable to have dengue as compared to adults. Furthermore, 72.0% respondents reported that children are most affected by dengue as compared to adults because of low immune system. Almost 88.5% respondents said that dengue is preventable while 11.5% said that it is not preventable. Result shows that large respondents did not know that how many people got infected by dengue annually. 15.3% said that the indoor protective measure to avoid dengue is use of mosquito coil, 60.0% said use of mosquito repellants and 24.7% said that all are taken as protective measure to avoid dengue. Above **Table 2** shows that 15.1% respondents reported dengue can be avoided by covering storage, 9.3% said that by window screens, 22.2% said by insecticide spray and 53.4% said by using all. Majority of the respondents reported that the source of information about dengue infection was TV/Radio. Study conducted by Malhotra et al. [17], also reported that majority of respondent reported that their main source of information regarding dengue was media.

Table 3 shows the results of binary logestic regression model with odd ratios. Logistic regression was used for identification of determinant of knowledge. Dengue was considered as binary response namely (yes, no) and all remaining were considered as independent variables at different levels. **Table 3** shows the odd ratios from binary logistic regression about the knowledge, attitude and practice regarding dengue.

Table 2 Basic demographic features, awareness regarding dengue and preventive measures.

Variable		Frequency	Percentage
Gender	Female	201	55.1
	Male	164	44.9
Age of respondent	15-20	91	24.9
	20-25	199	54.5
	Above 25	75	20.5
Respondent's qualification	Intermediate	30	8.5
	Graduate	53	14.5
	Master	217	59.5
	Master above	65	17.8
Residence of respondent	Rural	207	56.7
	Urban	158	43.3
Have you heard about dengue?	Yes	354	97.0
	No	11	3.0
Where dengue did breed?	Clean water	173	47.4
	Dirty water	172	47.1
	Hot water	2	0.5
	Don't know	18	4.9
What is vector for dengue fever?	Mosquito	325	89.0
	Air droplets	10	2.7
	House flies	10	2.7
	All above	20	5.5
Do you know about the time of biting of dengue mosquito?	Sunrise/sunset	216	59.2
	Night	36	9.9
	Afternoon	66	18.1
	Don't know	47	12.9
Which disease is transmitted by dengue?	Fever	55	15.1
	Malaria	46	12.6
	Dengue fever	257	676.7
	Don't know	17	4.7
What are the symptoms of dengue?	High fever/headache	164	44.9
	Joint pain/muscle pain	57	15.6
	Rashes	12	3.3
	All above	132	36.2
How dengue is transmitted?	Flies	16	4.4
	Mosquito	194	53.2
	Aedes mosquito	126	34.5
	Don't know	29	7.9
What is the most life threatening	Bleeding	104	28.5
	Fever	205	56.2
	Shocks	6	1.6
	Don't know	50	13.7
What are the after effects of dengue fever?	Fever	91	24.9
	Joint pain	86	23.6
	Skin rashes	42	11.5
	Death	146	40.0
What type of mosquito is carrier of dengue fever?	*Aedes* mosquito	210	57.5
	Flavivirus	48	13.2
	All types of mosquito	107	29.3
Why are the children most affected by dengue compared to adults?	High immune system	40	11.0
	Low immune sistem	263	72.0
	Don't know	62	17.0
Do you think it is preventable?	Yes	323	88.5
	No	42	11.5

How many people got infected by dengue annually?	100	26	7.1
	800	49	13.4
	9500	85	23.3
	Don't know	205	56.2
What is indoor protective measure to avoid dengue?	Use of mosquito coil	56	1.3
	Use of mosquito replants	219	60.0
	All above	90	24.7
How can we avoid dengue?	Covering storage	55	15.1
	Window screens	34	9.3
	Insecticide	81	22.2
	All above	195	53.4
What is the source of information about dengue infection?	TV/radio	224	66.8
	School	11	3.0
	Hospitals	70	19.2
	Newspaper	40	11.0

Table 3 Prevalence rate for awareness regarding dengue virus.

	B	S.E.	Odd ratios
Gender			
Male(r)			1.000
Female	0.798	0.814	2.222
Age			
15-20(r)	-	-	1.000
20-25	0.791	1.030	2.206
25 above	-	-	3.076
Education			
Intermediate(r)	-	-	1.000
Graduate	0.475	0.875	1.607
Masters	-	-	2.008
Master above	-	-	3.590
Region			
Urban(r)	-	-	1.00
Rural	1.032	0.718	2.807
Breeds			
Hot water(r)	-	-	1.000
Clean water	1.012	0.380	2.750
Dirty water	-	-	1.458
Preventable			
Yes	1.198	0.758	3.313
No(r)	-	-	1.000

It is observed that female respondents were 2.222 times more likely to have knowledge/awareness than that male respondent. It was also observed that the respondents in the age group 20-25 years were 2.206 times more likely to have knowledge/awareness about dengue than the respondents whose age group was 15-20; similarly the respondents whose age group was 25 above were 3.076 times more likely to have knowledge and awareness than the respondents whose age group was 15-20. Study also revealed that the graduate respondents were 1.607 times more likely to have knowledge/awareness regarding dengue than the respondents having the qualification group intermediate, similarly the respondents having the qualification group masters were 2.008 times more likely to have knowledge regarding dengue than the respondents whose qualification group was intermediate and the respondents having the qualification group above masters had 3.590 times more awareness regarding dengue fever than the respondents having the qualification group intermediate. It was also observed that the respondents belongs to rural area were 2.807 times more likely to have knowledge/awareness regarding dengue fever than the respondents belongs to the urban area. It was observed that 2.750 times more chances for dengue breed than the hot water similarly the dengue breeds in dirty water 1.458 times more likely than the dengue breeds in hot water. It was also noticed that the respondents were agreed that the dengue is preventable 3.313 times more likely than those respondent that were not agreed that the dengue is preventable.

Summary and Conclusion

This particular research was quantitative in nature and comprised a survey from the students of university of Azad Jammu and

Kashmir regarding awareness about dengue. Findings are drawn from whatever fits into the frame. The important result of the present study was as follow; by using chi-square, it was found that some variables are associated with dengue but some variables are not associated with the awareness of dengue. By the results of odd ratios, it was found that the awareness of dengue is most prevalent in the age group 20-25(OR=2.206). It was also observed that female students were (OR=2.222) times more likely to have knowledge/awareness than that male respondent **(Table 4)**. The value of odd ratios for qualification i.e., masters and above masters (OR=2.008, OR=3.590) times more likely to have awareness of dengue. By the descriptive analysis we find that a total of three hundred sixty five (365) respondents were recruited to participate in the investigation consisting of 201 (55.1%) male and 164 (44.9%) female. Majority of the respondents belongs to the age group of 20 to 25 years old (n=199, 54.5%). As for education, mostly respondents were Masters (n=217, 59.5%) and majority of respondent belongs to rural area (n=207, 56.7%). Vast majority of the respondents heard about dengue (n=354, 97.0%) and half of the respondents knew that dengue breeds in clean water while the half of respondents opined that dengue breeds in dirty water and hot water and majority of respondents knew that vector for dengue fever is mosquito and it is more likely to feed/bite in the time of sunrise/sunset (n=216, 59.2%). As for symptoms, most of the respondents agreed that a person with dengue infections may develop typical symptoms like fever, headache, joint pains, muscle pain, and rashes. Only 104 respondents knew that bleeding is the most life threatening sign of dengue infections. While half of (n=146, 40.0%) respondents knew that the after effects of dengue fever is death and half of the

respondents knew that the after effects of dengue fever are fever, joint pain and skin rashes. Significant number of respondents, (n=210, 57.5%) believed that *Aedes* mosquito transmits dengue infection. Majority of the respondents believed that the children are more affected by dengue as compared to adults because of low immune system. Similarly, majority of the respondents agreed that the dengue is preventable. While a large number of respondents didn't know that how many peoples infected annually by dengue. A significant number of respondents had knowledge about dengue prevention; greater proportion of the respondents cited the use of mosquito replants, as measures to reduce dengue. Majority of respondents reported that TV/radio was major source of information about dengue.

It is concluded from this investigation that the level of awareness about dengue and preventive practices among the study population is rather high. However, students face challenges to get correct information on dengue. In other countries, public health education programs help peoples to increase knowledge and awareness of the dengue. In Pakistan government has also launched different awareness programs related to dengue virus but researches have not carried out so far to check level of awareness of people in order to launch further campaigns. Taking this as a point of departure this study attempted to check level of awareness of university students about dengue. Results demonstrate that majority of the study population had knowledge of dengue. However, from our results we conclude that students need special attention in future health education programmes. Students with knowledge of the disease more frequently reported the use of preventive measures in this study

Table 4 Questionnaire about awareness regarding dengue virus and its preventive measures.

1	Gender	a. Male b. Female
2	Age of respondent	a. 15-20 b. 20-25 c. Above 25
3	Respondent's qualification	a. Intermediate b. Graduate c. Master d. Master above
4	Residence of respondent	a. Rural b. Urban
5	Have you heard about dengue?	a. Yes b. No
6	Where does dengue breed?	a. Clean water b. Dirty water c. Hot water
7	What is vector for dengue fever	a. Mosquito b. Air droplets c. House flies d. All above
8	Do you know about the time of biting of dengue mosquito?	a. Sunrise/sunset. b. Night c. Afternoon d. Don't know
9	Which disease is transmitted through dengue?	a. Fever b. Malaria c. Dengue fever d. Don't know
10	What are the symptoms of dengue?	a. High fever/headache b. Joint pain/muscle pain c. Rashes d. All above
11	How does dengue transmit?	a. Flies b. Mosquito c. *Aedes* mosquito d. All above
12	What is the most life threatening sign of dengue?	a. Bleeding b. Fever c. Shock d. Don't know
13	What are the after effects of dengue fever?	a. Fever b. Joint pain c. Skin rashes d. Death
14	What type of mosquito is carrier of dengue fever?	a. *Aedes* mosquito b. Flavivirus c. All types of mosquito
15	Why are the children most affected by dengue as compared to tadults?	a. High immune system b. Low immune system c. Don't know
16	Do you think it is preventable?	a. Yes b. No
17	How many people got infected with dengue annually?	a.100 b. 800 c. 9500 d. Don't know
18	What is indoor protective measure to avoid dengue?	a. Use of mosquito coil b. Use of mosquito replants c. All above
19	How can we avoid dengue?	a. Covering storage b.Window screens c. Insecticide d. All above
20	What is your source of information about dengue infection?	a. TV/Radio b. Schools c. Hospitals d. Newspaper

indicating that educational programmes are main tool in dengue prevention at least as long as an effective vaccine is not present. Study confirmed that increased knowledge and use of prevention measures decrease the risk of dengue infection. This study recommends a concerted effort by all the stakeholders including government, non- governmental organizations and civil society in addressing this health threatening issue. This study also suggests that comprehensive information about dengue virus, its modes of transmission and prevention measures need to be covered in awareness campaigns and workshops.

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