

Full Length Research Paper

Knowledge, attitudes and practices study of dengue viral infection and its association with environmental factors and health issues, Lahore Pakistan

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This study was designed to assess and compare the awareness, approach, and practices of dengue positive and dengue negative patients regarding dengue fever in a tertiary care hospital of Lahore district, Pakistan from April to May 2012. A total of 250 samples (125 dengue positive and 125 dengue negative) were collected and tested for Dengue IgM and IgG antibodies test by ELISA technique. Pre-tested questionnaire was used for data collection after the informed consent of the patients. Out of 250 study participants, 78% stated fever as major symptom of dengue virus, 70% had knowledge about the vector, 76% had idea about mosquitoes breeding sites and 80% considered dengue a treatable disease. For 50%, the main source of information about dengue was their TV/Radio. Regarding preventive practices, out of 80% who stored water at home, 52% used to cover their water containers, 64% used to wear protective clothing and 22% used mosquito repellents. Overall, 32% were satisfied from Governmental efforts against the spread of dengue fever. The study indicated that the community was quite familiar with Dengue, but there were some confusion about vaccination and water storage for domestic use.

Key words: Dengue fever, knowledge, attitudes, environment, IgM, IgG.

INTRODUCTION

Dengue is a viral mosquito-borne infection. About 24,000 deaths are reported annually because of dengue and it is prevalent in more than 100 countries. Flu-like illness is caused by the infection, which if persists can lead to the development of potentially lethal complication known as severe dengue or dengue hemorrhagic fever. Transmission has increased predominantly, in recent years, in the urban and semi-urban areas which become a major international public health concern (World Health Organization 2012). Dengue is caused by single-stranded RNA viruses which are about 40 to 50 mm in diameter and belong to the flavivirus group. Four species have

been described known as serotypes: DEN-1, DEN-2, DEN-3 and DEN-4. Three structural proteins (capsid C, membrane protein M, and envelope glycoprotein E) and seven non-structural proteins (NS1, NS2a, NS2b, NS3, NS4a, NS4b and NS5) are encoded by viral genome. In the E protein, the main biological properties of the viruses are located. Some of the nonstructural proteins play part in viral replication (Singhi et al., 2007).

The suitable temperature for development of the *Aedes* mosquito ranging from 15 to 30°C at this temperature face lower mortality rate (Yang et al., 2009). The symptoms of dengue infection are high fever, severe

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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 patients dengue fever leads to development of Dengue Hemorrhagic Fever (dhf), and at the time of subsidence of the fever, the patient may reflect problems with blood circulation. These can include blood in the urine or stool, bleeding gums or bloody nose. These symptoms may lead to death if untreated (Ohio Department of Health 2011). The primary vector of dengue is mosquito, *Aedes aegypti* and transmission may also cause by *A. albopictus*. Through the bites of infected female mosquitoes, the virus is transmitted to humans. Female mosquito feeds on blood because it needs protein for laying eggs. After incubation of virus for about 4 to 10 days, an infected mosquito is capable of transmitting the virus to the host for the rest of its life. The main carriers and multipliers of the virus are infected humans. The mosquito *A. aegypti* found in urban habitats and breeds commonly in man-made containers like flower vases, water storage jars, unused toilets bowls and choked roof gutters. *A. aegypti* is a daytime feeder; its peak periods of biting are early in the morning and evening before dusk (World Health Organization 2012). DHF is endemic in Asian countries; the epidemics went on increase in the last 15 years. At now, dengue becomes an important viral mosquito borne disease affecting humans.

In 1994, first outbreak of dengue fever was reported in Pakistan. In Pakistan, dengue virus is endemic, now kept on circulating throughout the year with a peak incidence in the period of post monsoon. Flood of 2010 in Pakistan made the situation worse (Jawad et al., 2001). The increase of global warming which is associated with increased precipitation actually creates hospitable habitat for immature mosquitoes. Survival of eggs and adult mosquitoes is based on higher humidity rates. Because of droughts, people store drinking water in containers that can also act as breeding sites for mosquitoes (Gage et al., 2008). Higher temperatures shorten the “extrinsic incubation period” time required by virus to replicate within the mosquito. So, virus in the mosquito within short time can reach its salivary glands and can be transmitted to humans (Johansson et al., 2009). Because of over crowded cities, inadequate sanitation, unsafe drinking water and such other factors, Pakistan is at high risk of dengue fever. Such conditions are suitable for the infectious diseases spreading and also a cause of dengue outbreak in different parts of the country which is associated with increased morbidity and mortality, each year. (Jahan, 2011).

This study is questionnaire based performed in a tertiary care hospital in order to assess the knowledge, attitude and practices of dengue positive and dengue negative patients related to dengue viral infection and it was found that overall knowledge of patients (both den-

dengue positive and dengue negative) was fair.

METHODOLOGY

The plan of work was based on the selection of a total of 125 dengue positive patients and 125 dengue negative patients. Blood samples were collected and tested for the detection of antibodies against dengue virus with the help of ‘third generation enzyme linked immunosorbent assay’. All dengue positive and dengue negative patients were interviewed and questionnaires were filled after taking informed consent from each dengue positive and dengue negative patient. Data was entered in SPSS on daily basis and analyzed for comparison of knowledge, attitude and practices regarding prevention and control of dengue fever practices in concerned areas.

Study area

The present KAP study was conducted to evaluate the knowledge, attitude and practices of Dengue positive and Dengue negative patients visiting tertiary care hospital in Lahore. The hospital is situated in Lahore and had more than 2399 beds. It is a multidisciplinary and a referral hospital. This hospital is also a teaching hospital of a medical university. The hospital has various departments.

Proposal of work

The study was done for evaluation of potential risk factors association and identification of possible routes of transmission through Dengue antibodies positive patients to Dengue antibodies negative patients. A total of 25 Dengue positive patients were randomly selected from the patients visiting for Dengue immunoglobulin M and immunoglobulin G test by ELISA method and 25 Dengue negative patients were selected from OPD of tertiary care hospital, Lahore (Figure 1). Blood samples were collected and questionnaire was filled and analyzed by the help of Statistical Package for Social Sciences (version 16.0; SPSS Inc., Chicago, IL, USA). The study was conducted during the month of April to May 2012; during the entire study period, various visits were made to collect the blood samples of patients for the detection of dengue antibodies by third generation ELISA method (Lange and Sarrazin, 2009).

A total of 25 dengue positive patients and 25 dengue negative patients were selected. Blood samples were collected and tested for the detection of antibodies against dengue virus with the help of third generation enzyme linked immunosorbent assay.

- i) All dengue positive and dengue negative patients were interviewed and questionnaire was filled after taking informed consent from each dengue positive and dengue negative patient.
- ii) Data was entered in SPSS on daily basis and analyzed for comparison of knowledge, attitude and practices regarding prevention and control of dengue.

Materials

The following equipments were used for both IgM and IgG testing for Dengue:

- i) ELISA microwell plate reader, equipped for the measurement of absorbance at 450/620 nm.

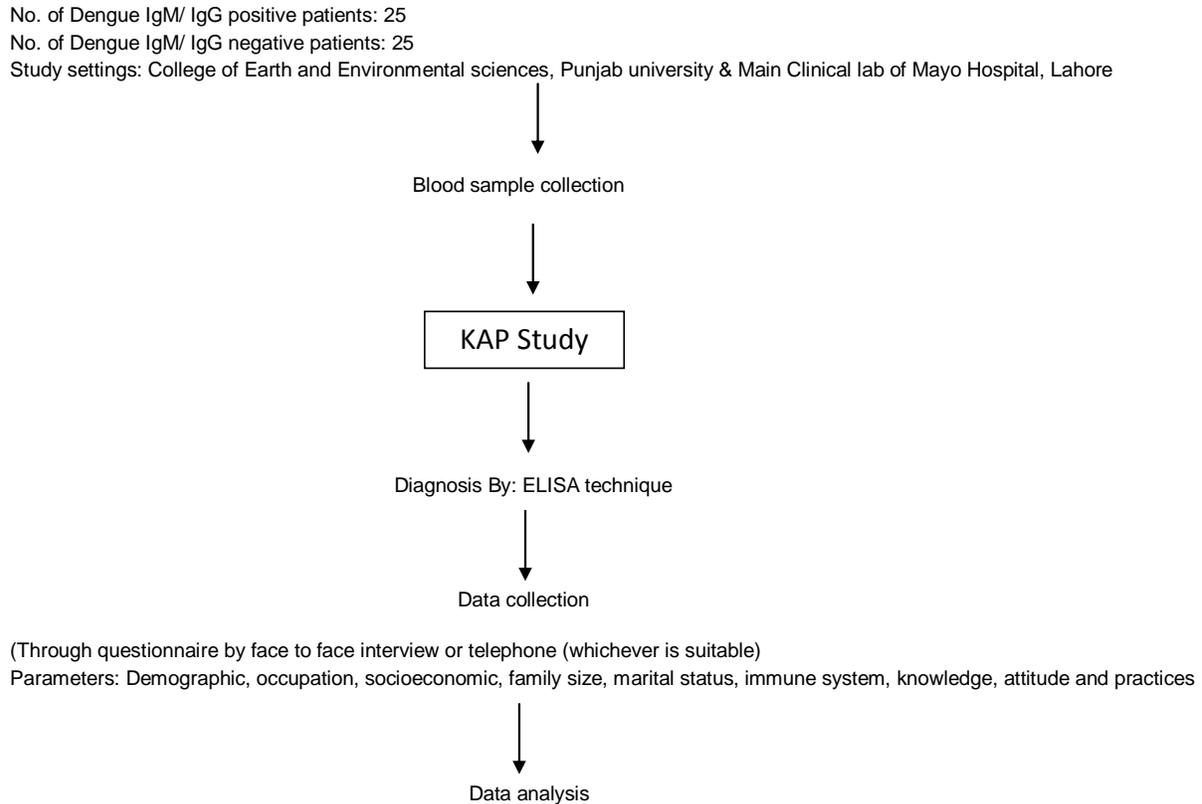


Figure 1. Random Test Sample

- ii) Incubator at 37°C.
- iii) Manual or automatic equipment for rinsing wells.
- iv) Micropipettes to deliver volumes between 10 and 1000 µl.
- v) Vortex tube mixer.
- vi) Deionized or (freshly) distilled water.
- vii) Disposable tubes.
- viii) Timer.
- ix) Dengue IgM ELISA Kit (Nova Lisa TM).
- x) Dengue IgG ELISA Kit (Nova Lisa TM).
- xi) 5 mm BD syringes.
- xii) Centrifuge machine.

Material supplied with kit

- i) 1 Strip holder.
- ii) 1 Cover foil.
- iii) 1 Test protocol.
- iv) 1 distribution and identification plan.

Principle of the assay for Dengue IgG/IgM test

The qualitative immunoenzymatic determination of IgG-class/IgM-class antibodies against Dengue virus is based on the ELISA (enzyme-linked immunosorbent assay) technique. Microtiter strip wells are precoated with Dengue virus antigens type 2 to bind corresponding antibodies of the specimen. After washing the wells to remove all unbound sample material, horseradish peroxidase (HRP) labeled anti-human IgG/IgM conjugate is added. This conjugate binds to the captured Dengue virus-specific antibodies. The immune complex formed by the bound conjugate is visualized

by adding tetramethylbenzidine (TMB) substrate which gives a blue reaction product. The intensity of this product is proportional to the amount of Dengue virus-specific IgG/IgM antibodies in the specimen. Sulphuric acid is added to stop the reaction. This produces a yellow end point color. Absorbance at 450 nm is read using an ELISA microplate well reader.

Dengue enzyme immunoassay was used for qualitative determination of antibodies (IgM/IgG) in human serum or plasma samples. The serum obtained through centrifugation was further processed for the detection of antibodies against Dengue by using ELISA Kit. Tests for the Dengue were carried out in 'main clinical pathology lab' of a tertiary care hospital in Lahore.

RESULTS

Practices to avoid dengue fever

With regards to personal preventive practices, the storage of water in covered containers for domestic usage was widespread among dengue negative patients. Among dengue positive patients, 105(84%) used to store water at home, but only 45(36%) practiced to cover their containers; and in case of dengue negative patients, 95(36%) used to store water at home and 85(68%) practiced to cover their containers. However, 75(60%) dengue positive and 85(68%) dengue negative patients stated that they used to wear protective clothing that is, full sleeves shirts and long trousers. The use of mosquito repellents and bed nets was not found common among

Table 1. Preventive practices against dengue fever.

Variable	Number (%)		
	Dengue positive	Dengue negative	Total patients
A) Personal preventive practices			
Storage of water at home			
Yes	105(84%)	95(76%)	200(80%)
No	20(16%)	30(24%)	50(20%)
Coverage of water containers			
Yes	45(36%)	85(68%)	130(52%)
No	80(64%)	40(32%)	120(48%)
Wearing of long sleeved clothing			
Yes	75(60%)	85(68%)	160(64%)
No	50(40%)	40(32%)	90(36%)
Application of mosquito's repellents			
Yes	5(4%)	50(40%)	55(22%)
No	120(96%)	75(60%)	195(78%)
B) Practices taken by Government			
Role in leveling defective ground surfaces			
Yes	20(16%)	20(16%)	40(16%)
No	105(84%)	105(84%)	210(84%)
Role in providing insecticides, repellents and bed nets			
Yes	0(0%)	5(4%)	5(2%)
No	125(100%)	120(96%)	245(98%)
Role in providing spraying facility			
Yes	110(88%)	90(72%)	200(80%)
No	15(12%)	35(28%)	50(20%)

patients. Regarding practices taken by Government, 110(88%) dengue positive and 90(72%) dengue negative patients stated that Government provided spraying facility in their areas, 105(84%) dengue positive and dengue negative patients stated that Government did not play part in leveling defective ground surfaces whereas 125(100%) dengue positive and 120(96%) dengue negative patients stated that pesticides, repellents and bed nets were not provided by Government. The detailed data of practices to avoid dengue has been shown in Table 1.

Socio demographic information

Out of 250 patients, 125 were dengue positive and 125 were dengue negative. The sample comprised of 70(56%) dengue positive, 55(44%) dengue negative males and 55(44%) dengue positive, and 70 (56%) dengue negative females. The mean age of dengue positive patients was 32 years and of dengue negative

patients was 30 years. Illiteracy rate was observed high among respondents, about 85(68%) of dengue positive and same number of dengue negative patients had education up to secondary level and only 10(8%) of dengue negative patients were completed tertiary education that is, up to post college. In terms of income 20(16%), dengue positive patients and 50(40%) dengue negative patients had their income between 1,000 to 10,000 rupees and only 15(12%) dengue positive and 10(8%) dengue negative patients had income above 30,000 rupees, the detailed information regarding socio demographics is given in Table 2.

Knowledge of dengue fever

High percentages of surveyed respondents such as 110(88%) dengue positive, 85(68%) dengue negative patients correctly identified main symptom of dengue virus that is fever; whereas low percentages of respondents identified skin rashes and bleeding from

Table 2. Socio-demographic characteristics of study participants.

Characteristic	Number (%)		
	Dengue positive	Dengue negative	Total patients
Gender			
Male	70(56%)	55(44%)	125(50%)
Female	55(44%)	70(56%)	125(50%)
Educational level			
Secondary school	85(68%)	85(68%)	170(68%)
Under graduate	40(32%)	30(24%)	70(28%)
Post graduate	0(0%)	10(8%)	10(4%)
Household income			
5000-10000	20(16%)	50(40%)	70(28%)
11000-20000	60(48%)	30(24%)	90(36%)
21000-30000	30(24%)	35(28%)	65(26%)
>30000	15(12%)	10(8%)	25(10%)

nose as symptoms of dengue virus given in Table 2. Most participants, 90(72%) dengue positive and 85(68%) dengue negative patients were aware that mosquito transmits dengue virus to host; whereas, only 10(8%) dengue positive patients stated that flies are the main vector of transmission. When asked about breeding sites, 45(36%) dengue positive, 25(20%) dengue negative patients stated it is garbage and 45(36%) dengue positive, 75(60%) dengue negative patients had idea that water is required for breeding of mosquitoes, the remaining ones did not have idea about mosquitoes breeding sites. 90(36%) of all respondents (45 dengue positive and 45 dengue negative) correctly identified biting times of mosquito that is sunset/sunrise. Regarding sources of information, majority of 50(40%) dengue positive, 75 (60%) dengue negative patients reported they came to know about dengue from TV/Radio; whereas only 15(12%) dengue positive and 20(16%) dengue negative patients obtained information from newspapers/magazines. Other sources of information found among patients were health personnels and relatives/friends, detailed percentages are mentioned in Table 3.

Attitude towards dengue fever control

Regarding treatability of majority of respondents, 105(84%) dengue positive, 95(76%) dengue negative patients showed positive attitude that dengue is treatable and when asked about responsibility of maintaining hygienic environment positive attitude observed among respondents 75(60%) dengue positive and 90(72%) dengue negative patients started to cooperate with neighborhood in leveling defective ground surfaces.

Attitude of self medication or self-treatment was also observed among respondents (Table 4).

DISCUSSIONS

In this questionnaire based survey, the ratio of male to female respondents was same; this may be due to random selection of patients. Among all 250 of respondents, 170(68%) patients had education up to secondary level which may be due to poverty, under developed education system and may be due to the fact that mostly visited persons belongs to rural or under developed areas, with low income and less number of educational facilities in their areas. The survey further revealed that only 25(10%) of respondents belongs to upper middle class because this class commonly prefer private hospitals.

Majority of patients 195(78%) identified fever as a major symptom of dengue fever and about half of respondents 120(48%) had idea about exact mosquito breeding site that is stagnant water, only a few 10(4%) patients identified flies as actual transmission route of dengue virus, these are actually the dengue awareness campaigns after the epidemic outbreak of virus in 2011 which make the people aware about disease. 35(14%) of study participants came to know about dengue from newspaper and magazine, the reason behind this is lack of interest of participants to read newspaper or reliance on radio/TV as a source of information. Most of respondents, 200(80%) said that dengue is a treatable disease. This is actually due to provision of proper medical facilities by Government in well-developed health centers after the emergence of disease. This survey revealed that 80(64%) respondents took paracetamol in

Table 3. Knowledge variables regarding dengue fever among study participants.

Variable	Number (%)		
	Dengue positive	Dengue negative	Total patients
Symptoms			
Fever	110(88%)	85(68%)	195(78%)
Skin rash	10(8%)	0(0%)	10(4%)
Bleeding from nose	5(4%)	5(4%)	10(4%)
All of the above	0(0%)	25(20%)	25(10%)
Do not know	0(0%)	10(8%)	10(4%)
Transmission route			
Mosquito bite	90(72%)	85(68%)	175(70%)
Flies	10(8%)	0(0%)	10(4%)
Sharing food	0(0%)	10(8%)	10(4%)
Do not know	25(20%)	30(24%)	55(22%)
Breeding site			
Garbage	45(36%)	25(20%)	70(28%)
Stagnant water	45(36%)	75(60%)	120(48%)
Do not know	35(28%)	25(20%)	60(24%)
Biting time			
Sunset/Sunrise	45(36%)	45(36%)	90(36%)
Day Time	10(8%)	15(12%)	25(10%)
Night	70(56%)	65(52%)	135(54%)
Sources of information on dengue			
Radio/TV	50(40%)	75(60%)	125(50%)
Newspapers/magazines	15(12%)	20(16%)	35(14%)
Health personnel	15(12%)	10(8%)	25(10%)
Relatives and friends	45(36%)	20(16%)	65(26%)

Table 4. Attitude towards dengue fever.

Variable	Number (%)		
	Dengue positive	Dengue negative	Total patients
Treatability of dengue			
Yes	105(84%)	95(76%)	200(80%)
No	5(4%)	10(8%)	15(6%)
Do not know	15(12%)	20(16%)	35(14%)
Cooperation with neighborhood in maintaining hygienic environment			
Yes	75(60%)	90(72%)	165(66%)
No	50(40%)	35(28%)	85(34%)
Self medication or self treatment			
Take Panadol	90(72%)	70(56%)	160(64%)
Drink a lot of water	15(12%)	10(8%)	25(10%)
Take medicine and drink Water	5(4%)	5(4%)	10(4%)
Do not know	15(12%)	40(32%)	55(22%)

first stage of fever. This trend of self-medication is due to the hesitation among patients to consult the doctor because of their personal beliefs or misconceptions and also due to economic instability of the patients or may be due to availability of medicines on medical stores without prescription. The practice of storing water was found among 200(80%) of respondents and out of these, 130(52%) used to cover water containers tightly. This may be due to dengue awareness campaigns in reported areas of this country, in which information is provided to people that open water is the breeding site for the mosquitoes; because of that useful information, poor personal practices against the spread of the dengue fever were found among few of respondents. Among all respondents, only 90(36%) refused to wear the long sleeved clothing in order to protect themselves from dengue because of the hot weather.

In this study, 245(98%) of respondents stated that the control of dengue fever is the issue to be solved by the government. This is due to insufficient involvement of the Government against the spread of the dengue fever because in our country only spraying facility is provided properly and awareness campaigns were arranged by Government; whereas, Government did not play an important role in leveling defective ground surfaces to avoid accumulation of stagnant water and also did not provide bed nets, insecticides and repellents to reported communities, it is the matter of Government to participate actively in making the situation better. Compared to our results, more than half of the parents (54%) had good knowledge about signs, symptoms and modes of transmission of dengue. Approximately, 47% considered dengue to be a serious but preventable disease to which they are vulnerable. Nevertheless, a majority (77%) did not use effective dengue preventive methods such as screening of homes and 51% did not use bed nets.

Educational attainment (OR, 2.98; CI, 1.23 to 7.23) was positively associated with knowledge of dengue. There was no correlation between knowledge about dengue and preventive practices ($p = 0.34$). Radio and TV were the predominant sources of information about dengue fever (Faisal et al., 2010).

Conclusions

Among all respondents, illiteracy rate was observed high. Majority of respondents belonged to joint families. Most of the respondents identified fever as a major symptom of disease, mosquito bite as causal agent of disease and got knowledge from TV/radio about dengue fever. Majority of respondents had knowledge that dengue fever is severe and curable. Regarding preventive practices, maximum respondents used to store water at home and

used to cover water container. Wearing of long sleeved clothing is common personal preventive practice observed among respondents. It is stated by majority of respondents that Government did not play a part in leveling defective ground surfaces to avoid accumulation of stagnant water and did not provide insecticides, repellents and bed nets to their communities, but spraying facility provision by Government found common among respondents. Overall, the knowledge and preventive practices taken by dengue negative patients found good as compare to dengue positive patients. Climate change including increase in temperature, precipitation and humidity is considered as main factor to increase the epidemics of dengue virus in different parts of the world.

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