ORIGINAL ARTICLE

Seroepidemiology of Dengue Viral Infection in Peshawar

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ABSTRACT

Background: Dengue viral infection is the most prevalent infection particularly in the months of September to December in different region of Khyber Pakhtunkhwa. The aim of this study was to determine the prevalence of dengue viral infection in district Peshawar.

Methods: A cross-sectional study was conducted and recruited two hundred suspected dengue viral infected patients. Blood were collected for diagnosis of dengue viral infection through immunochromatograpy technique. All the collected data analyzed through Microsoft Excel 2020.

Results: A total of 200 suspected dengue viral infected patients participated. Among total, 59.5% were male and 40.5% were female patients. Out of total, 61 were found positive through NS-1 strips. IgG antibodies were more found in male than female. Whereas, IgM antibodies were more prevalent found in female patients.

Conclusion: Overall, the prevalence of dengue viral infection is more in our region. The prevalence of dengue viral infection is greater in male patients as compared to female patients. It is important to arrange different prevention programs including seminars, workshops and conference throughout the district. Implementation of control and surveillance programs are highly essential to determine regarding the dengue level. Health policy makers need to pay attention towards the dengue disease and to provide different training session to health care providers and physician.

Keywords: Dengue viral infection, Sero-prevalence, Epidemiology

INTRODUCTION

Dengue is caused by ssRNA virus from the family Flavivirdae and genus Flavivrus[1]. Serotypes 1, II,III and IV are different types of dengue virus among which serotype II is predominant followed by serotype III in Pakistan[2]. The mosquito belong from Aedes genus can transmit dengue virus in human beings during daylight[3]. During the world war II Aedes albopictus was responsible for epidemic in Japan and Taiwan[4]. This epidemic spread in 1970s in the Scychelles island, La Reunion Island and China[5]. At the start of 21st century it was reported in Macao and Hawaii. Acedes aegypti is highly concerned with hemorrhagic fever during the above mentioned epidemic areas[6]. Aedes aegypti is highly urbanized mosquito prefer to feed on human and breeding in domestic usage water[7]. At Karachi the first dengue fever was reported in Pakistan in 1994-1995[8]. Serotypes II and III made huge outbreak of dengue infection in Pakistan in 2006 followed by another huge outbreak occurred in 2011 in Lahore and in KPK in 2013 in which more than 20000 thousand human and died about 4000[9]. Dengue hemorrhagic and dengue shock syndrome are more severe form of dengue infection[10].

The World Health Organization (WHO) classified dengue infection into three clinical stages including without warning signs, with warning signs and severe dengue infection. The symptoms of warning signs include abdominal pain, vomiting fluid accumulation, mucosal bleeding, lethargy, liver enlargement hematocrit with decreasing platelets while the symptoms of severe dengue include severe plasma leakage, severe bleeding or othan failures[11]. Other symptoms includes high grade fever, headache, skin rash, muscle pain, joint pain and retro- orbital pain etc [12]. Globally more than 100 million of dengue cases and 25000 estimated deaths per annum was reported according to World Health Organization report[13]. For dengue there is no specific vaccine and anti – viral treatment is available therefore it causes globally health problem[14]. The main reason of this epidemic in Pakistan due to many reasons such as crowded cities polluted water, sanitation problem, large number of refugee and not proper vaccination. The development of vaccine is quite challenging against dengue virus because there is no efficient animal model available for DHF and DSS[15]. The genome of dengue virus is 11 kilobases having plus standard RNA. There is polyprotein precursor of about 3000 amino acids which cleaved to generate 10 proteins out of which three are structural protein include the core- protein, membrane associated protein and envelope protein. The order of gene on seven non structural protein are CPr M (M)- E-NS1-NS2A-NS2B-NS3-NS4A NS4B-NS5[16]. All these protein is responsible for Cellular function as well as cell replication. Among the three structural protein the core- protein is the basic protein which interact with RNA this protein is present in the nucleus[17]. Membrane associated protein is glycoprotein that assist to envelope protein to form mature virons[18,19]. While on the surface of the virus the envelope protein is present through which virus attached with their host. The aim of this study was to determined the serological (Rapid Testing) identification of dengue viral infection in our region.

MATERIAL AND METHOD

This study was conducted in urban and rural areas of district Peshawar KPK in which the main objective is the seroprevalance of dengue fever. Through this study we can also come to know that which population is more prevalent. Our study are descriptive study which is carried out at Biotechnology department university of Peshawar. Duration of this study was from June 2022 to October 2022. We perform random sampling through sampling techniques from about 200 patients. The age of the patients including in the study was 18, plus. These all are resident of different locations of district Peshawar KPK.

The ethical review committee of the biotechnology department university of Peshawar KPK gave the premission to carry out this study. We tell each nominated subject for their selection purpose and were asked the question on a written informed consent. The biodata of every individual were collected.

Through highly sensitive ELISA kit we detect four types of dengue serotypes. The specificity and sensitivity of the IgG ELISA are 96% and 100% respectively while of the IgM ELISA kit are 100% and 86% respectively.

For data analysis we use SPSS V.16 software to determine the relationship between gender, age groups, history of travel to an endemic area and area of residence. We use chi square analysis. The P value < 0.05 was considered statistically significant.

RESULTS

A total of two hundred suspected viral infected patients were recruited in which male were 59.5% (n=119) and female were

40.5% (n=81) (Table 1). Among total two hundred patients, NS-1 was found positive in 61 patients in which male were 40 patients and female were 21 patients. While 139 patients were negative for NS-1 (Table 2). IgG antibodies were found positive in eight patients while negative for 192 patients (Table 3). Similarly, IgM antibodies were also tested and found positive in 15 patients while negative in 185 patients (Table 4).

Table 1: Gender-wise distribution of suspected dengue patients

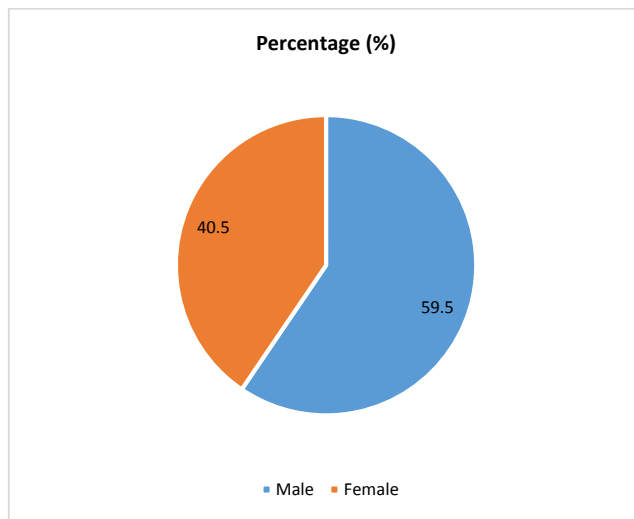| Gender	Sample size (n)	Percentage (%)
Male	119	59.5
Female	81	40.5
Total	200	100

Figure 1: Gender-wise distribution of suspected dengue patients

Table 2: Gender-wise distribution of NS-1 dengue positive and negative patients

Gender	Male	Female	Total
Positive	40	21	61
Negative	79	60	139
Total	119	81	200

Table 3: Gender-wise distribution of IgG dengue positive and negative patients

Gender	Male	Female	Total
Positive	06	02	08
Negative	113	79	192
Total	119	81	200

Table 4: Gender-wise distribution of IgM dengue positive and negative patients

Gender	Male	Female	Total
Positive	07	08	15
Negative	112	73	185
Total	119	81	200

DISCUSSION

The reports shows that dengue viral infection has entered in Pakistan through seaport of Karachi. Several outbreaks of dengue viral infection occurred in Pakistan[20]. It is suggested that dengue infected patients need to take fluids including intravenous fluids, juices, and other medicines[21]. Both IgG and IgM antibodies were detected in several cases like reported in other studies. IgG and IgM antibodies were detected in large number of patients reported from other region of Pakistan as compared to our present study[22]. Highest number of positive patients were found male as compared to female patients[23,24]. This high positive cases in male might be due to frequent exposure of male to environment, travelling history, using of short sleeves clothes, working in sewage and other

industries[25]. The reported study shows that strict preventive strategies are required for traveling nationally and internationally particularly in epidemic. These preventive measurements will help to reduce the dengue viral infection and this could be a factor to convert epidemic areas to non-epidemic regions[26]. A study reported higher humidity and rain fall factor which provides a suitable condition for the growth, development and hatching of eggs in such areas[27].

It is evident that dengue viral infection varies from region to region and seasons of the year in our country. Greater transmission of the viral infection associated with the host characteristic vectors and the other etiological agents[28].

Several other consequences of dengue viral infection also reported such as dengue hemorrhagic fever (DHF) and denue shock syndrome (DSS)[29]. Which is the serious clinical manifestation of dengue viral infection characterized by lower platelets level, bleeding disorders, hypotension, blood vessels leakages, and shock syndrome[30].

The sample size in study was less, urban and rural cases were also not differentiated. Other sign and symptoms were not identified in our study. Hematological and biochemical parameters were also not obtained in these patients. A large scale study with greater sample size is required in different districts of Khyber Pakhtunkhwa. History, economical status, and other necessary confounding factors need to find the way of dengue viral infection.

CONCLUSION

Efforts required in order to tackle the dengue viral infection in Peshawar and other districts of Khyber Pakhtunkhwa. Several initiative steps has been taken by health department of Khyber Pakhtunkhwa but still further strategies necessary to reduce the infection particularly the biological, environmental and other crucial preventive measurements. Furthermore, awareness among general population is required to handle the epidemic of dengue viral infection. Moreover, important research investigation are required on a large scale to get the severity of dengue infection.

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