



Research Article

Outbreak of Dengue Fever in District Mansehra, Pakistan

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Authors' Contributions

KM was the chief investigator of the study. SR collected the data. HS carried out the lab work. NA helped in data analysis. MS wrote the article while AR reviewed it critically.

Keywords

Dengue Virus, Prevalence, Mansehra, Pakistan.

Abstract | Current study was conducted in the autumn season of 2015 to determine the prevalence of Dengue fever virus in district Mansehra, Pakistan. Patients were selected with the convenience sampling which were admitted in Al-Khidmat foundation and King Abdullah hospitals in Mansehra, Pakistan, where patients were screened for dengue virus non-structural protein using Rapid Diagnostic kit for DENV *i.e.* (SD BIOLINE Dengue IgG/IgM. Data was obtained from patient's record, filled forms and through questionnaire. Total 1332 blood samples were collected from 3 tehsils of District Mansehra. Out of which, 725 were found positive for dengue fever infection. Out of 725 positive cases, 410 (56.5%) were males and 315 (43%) were female's patients. The high rate of DENV infection was found in the age group of 10-20 years that was 133(57.3%) followed by age group of 31-40 years that was 129 (57%) and 41-50 years that was 96 (57%). The lowest infection was found in age group above 70 years. Tehsil Mansehra and Tehsil Oghi is more affected than Tehsil Balakot because these two Tehsils are more unhygienic than Balakot. It is concluded from the study that Dengue Fever is more prevalent in males other than females of district Mansehra Khyber Pakhtunkhwa Pakistan and its high proportion will result in high death rate. So, the possible measures should be taken out to control DENV spread in future.

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Introduction

Dengue is the very familiar and important viral disease in the world which is transmitted through arthropods. Round about 2.5 billion inhabitants of subtropics and tropics; it approximately 2/5th of the population in world (Dash *et al.*, 2013; Gubler and Clark, 1995). The word DENV (Dengue virus) is taken from Swahili term kidengo pepo, means suddenly and abrupt attack of any evil spirit. In the second world war era, from 1942 to 1944 Japan like Osaka, Nagasaki, and Kobe, are epidemic for DF which have been occurred and involved in 200,000 cases (Sabin and Schlesinger, 1945).

Dengue fever virus is belonging to family Flaviviridae, Flavivirus genus (Word Flavivirus is derived from latin language flavis mean yellow induce by yellow fever virus). It comprises genus of medically important arthropods spreading diseases. It includes envelop viruses (Burke and Monath, 2001; Lindenbach and Rice, 2001). DENV was transferred to humans by *Aedes* mosquitoes mostly through *Aedes aegypti*. At the base of neutralization data four serotypes are discovered. Dengue virus 1 (DENV-1), dengue virus 2 (DENV-2), dengue virus 3 (DENV-3) and dengue virus 4 (DENV-4) (Guha-Sapir *et al.*, 2005).

Based on available molecular data dengue viruses show a greater extent of genetic diversity. Recombination, Gene flow, Mutation, it is more susceptible in these hosts such as Monkey population and the viruses with a broad

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December 2018 | Volume 33 | Issue 2 | Page 99

range of pathogenic characters are the major contributing factors of genetic diversity (Holmes and Burch, 2000).

Materials and Methods

Introduction to district Mansehra

Mansehra is one of the important district of Khyber Pakhtunkhwa with approximately 1,152,839 populations. The growing rate of Mansehra is 2.4%, respectively. The area of the Mansehra District is 4,579 square Kilometers, which is divided into three main tehsils *i.e.* Tehsil Mansehra, Tehsil Oghi and Tehsil Balakot.

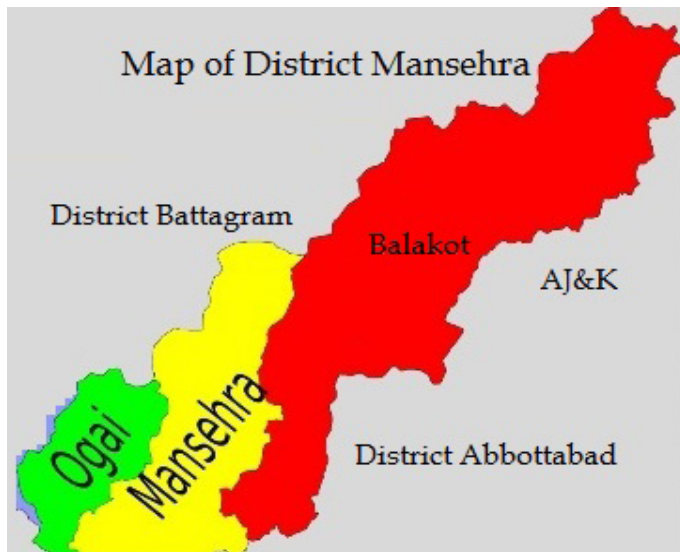


Figure 1: Map showing the study area.

Blood sampling

During this study, 1332 blood samples were collected from the three tehsils of district Mansehra. The collection was done through specialized performas which contain the whole information about the patient. After completing the initial data, 3mL blood was collected through (Shifa) disposable syringes. The collected blood was then transferred to serum tubes (ATLAS-LABOVAC Italiano) containing oxalate to minimize the chance of blood clotting. The blood was then transferred to the Al-Khidmat Lab Mansehra. The blood was then centrifuged to separate serum. The separated serum was then transferred to Eppendorf tubes and was stored at -80°C .

Immuno chromatographic test (ICT)

Sera screening was done for anti-DENV antibodies with the help of Immuno-chromatographic tests by using strips in general population of District Mansehra.

Statistical analysis

Statistical analysis of the data is done and the results were obtained in rates (%).

Results

A descriptive study was conducted to find out the prevalence of DENV infection in the general population of district Mansehra, Khyber Pakhtunkhwa, Pakistan. In this study, 1332 blood samples were collected from the whole district Mansehra along with the Performa for taking whole information from the patient. Among the total 1332 blood samples, 718 were males and 614 were females. The data was collected from different age groups. The infection rate was different in different age groups (Table I; Figure 2).

Table I: Blood samples collected from district Mansehra.

Tehsil	No of Samples	Male	Female
Mansehra	472	253	219
Oghi	457	251	206
Balakot	403	214	189

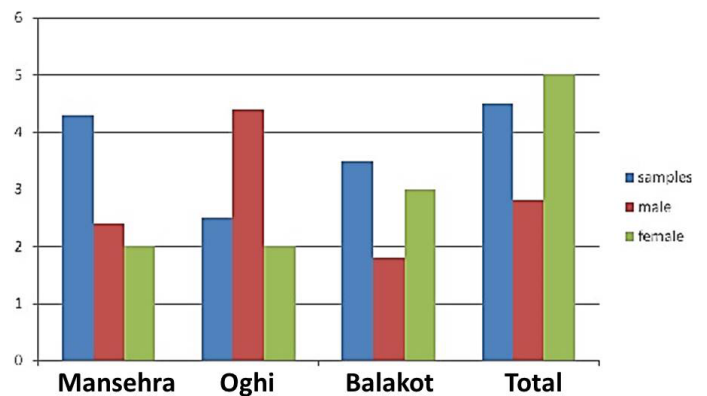


Figure 2: Basic information about the blood samples collected from district Mansehra.

All the individuals were categorized into five age groups. Sera were isolated from all the blood samples and subsequently tested for anti-DEHV antibodies by Immuno Chromatographic test (ICT). The samples were first tested using ICT strips method and Rapid Diagnostic kit for DENV *i.e.* (SD BIOLINE Dengue IgG/IgM. Manufactured by Standard Diagnostics kits, Inc.

The results indicated that out of 1332, 725 individuals had DEHV antibodies in their blood. These individuals belonged to various age groups (Table II).

Table II: Age wise distribution of the anti-DENV.

Age group	No of samples	Male	Female
1-10 years	150	82 (54%)	59 (39%)
10-20 years	232	133 (57.3%)	102 (43%)
20-30 years	333	187 (56%)	146 (43.8%)
30-40 years	223	129 (57.8%)	94 (42.1%)
40-50 years	168	96 (57.1%)	72 (42.8%)
50-60 years	134	57 (42.5%)	57 (42.5%)
Above 60	99	47 (47.4%)	52 (52.2%)

Discussion

This was the first outbreak of Dengue fever in Mansehra district which was reported. Mansehra district with 11,52,900 peoples were situated exactly in north east of KP province of Pakistan. Mansehra district has poor and unhygienic conditions therefore more male population was affected than females. The result showed that out of 1332 total samples, 725 samples were positive for dengue antibodies. The present studies also showed that prevalence of dengue fever in tehsil Mansehra is very high.

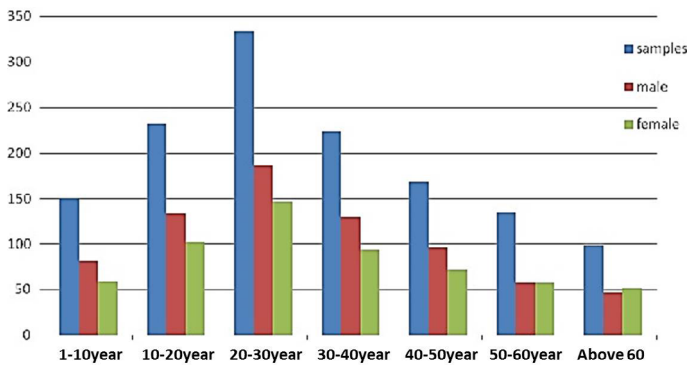


Figure 3: Age-group wise prevalence of dengue fever.

Presence of large agriculture land, rich fauna, artificial water reservoir, open irrigation channels heavy rainfall provides a suitable place for mosquito's vector breeding. The activities of dengue virus are different according to the different geological areas and climate of Pakistan and typically these cases are much higher after the rainfall.

Present study revealed that in Mansehra District male were more suffered than females with dengue fever but higher prevalence was recorded in the age group of 10 to 20 *i.e.* 57%. Second greater number of prevalence was noted with in the age of 31 to 40 *i.e.* 57% and the third greater prevalence was analyzed in the age of 41 to 50 *i.e.* 50%. Evidence shows that this was due to lack of awareness about what is the difference between common fever and dengue fever. People don't have enough knowledge about the early treatment and precautions of dengue infection. So, all the age groups are equally affected. After the comparison of the reports of both positive and negative results it was clearly understood that along with other changes most probably number of platelets and WBCs is most affected. Result shows that the out of 1332 samples in 725 samples number of white blood cells and platelets is less than their normal range while in negative samples WBCs and platelets are in their normal range. Another peculiar finding in this study was that among 8261 patients with low platelet counts ($<150,000/\text{mm}^3$) and only 2248 cases were positive for IgM and IgG antibodies (Usman *et al.*, 2013).

It was noted that DENV is the main health issue in Mansehra District. Data is collected from the whole Dis-

trict which showed that DENV is prevalent in Mansehra District. So, if protective measurements are not taken then it is possible that DENV will become deadly spreading disease in Mansehra District KP Pakistan.

The prevalence of DENV in different age groups of both sexes was studied and the maximum prevalence of DENV was found in both males and females. Our study agrees with the fact that male population is more affected by DENV in District Mansehra. High prevalence in male and female could be attributed to their exposure status to various DENV risk factors which was quite evident from the life style and history of the individuals sampled for this study. Same result shown by the study of Hussain *et al.* (2018), that male population of District Swat is more suffered by dengue fever than female population. However, according to a study by Montenegro11 there was a predominance of male gender among the 14 patients being studied who died of dengue fever. This could be attributed to small sample size. The risk of infection was seen to increase with advancing age according to a study in Brazil (Braga *et al.*, 2010).

Over all our study reveals that 70% of the population of district Mansehra do not have antibodies against DENV in their blood while 30% people have antibodies against DENV. A study conducted in Nepal shows that male community members are more infected as compared to females. At least 15 males travel more frequently as they have no travelling restrictions, which may be the reason for high number of cases reported in males. It indicates that the disease may transfer from one place to another place. The area-wise analysis shows that most of the positive cases were recorded from tehsil Mansehra, as the area has poor sanitation and drainage system, and such conditions are conducive to the breeding of dengue vectors. A comprehensive community and governmental control strategy, including the seeding of water vessels with Copopods (fish) that feed on mosquito larvae, was successful in eliminating *A. aegypti* and dengue transmission in 32 communities in rural areas of Vietnam (Veddadi and Veddadi, 2015).

According to our study the disease is more prevalent in adults whereas in South East Asia, DHF is primarily a children's disease.

Conflicts of interest

The authors declare no conflicts of interest.

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