

Seroprevalence of Various Viral Diseases in Various Districts of North West Punjab

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ABSTRACT

Introduction: Emergence of viral infections can be due to genetic exchanges, mutations changed social patterns like urbanisation, rapid transport, migration of people or vectors, and changing life-styles. Seroprevalence of viral infections represents cumulative exposure to infection the accuracy of which must be addressed on the individual level and at the level of population.

Material and methods: The present study was a prospective study done on the blood samples from a total of 5512 patients suspected of various viral diseases received at Viral Research and Diagnostics Laboratory (VRDL) located at tertiary care hospital from January 2018 to June 2019. The samples were tested by Enzyme linked immunosorbent assay (ELISA) for the detection of antibodies.

Results: Out of the total 5502 samples 2942 (53.47%) cases have been reported to be positive for one or more of these viral infections. It is noteworthy that the HCV is predominant in the studied districts followed by Dengue, HSV, HEV, HBV, followed by HAV, Rubella 40/94 (42.55%) and CMV.

Conclusion: The epidemiology of the deadly viral diseases needs to be studied in depth and there is paucity of data on epidemiology of the viral infections in India, particularly in the region of Punjab. Emerging and re-emerging infectious diseases are becoming an increasingly important area of concern in public health.

Keywords: Seroprevalence, Viral Diseases, Dengue Virus, Hepatitis Virus

INTRODUCTION

Viruses are known to cause outbreaks and are the major cause of human morbidity and mortality leading to significant healthcare expenditure in India.¹ Vector-borne viral diseases like dengue, chikungunya are menace to health and development, affecting the economically vulnerable population and accounting for 17% of global burden of all infectious diseases.² Emergence of viral infections can be due to genetic exchanges, mutations changed social patterns like urbanisation, rapid transport, migration of people or vectors, and changing life-styles.³ Ecological changes like deforestation or afforestation, rearing of livestock or birds may also contribute to emergence of viral diseases.⁴ To fight against these emerging viral infections, an extensive strategy needs to be evolved. Epidemiology of viral diseases requires to be studied in detail for which a national viral surveillance system needs to be established.

Seroprevalence of viral infections represents cumulative exposure to infection the accuracy of which must be addressed

on the individual level and at the level of population. Serological diagnosis has an advantage of not being affected by seasonality due to the long duration of specific antibody responses. For investigation of epidemics and prediction of viral outbreaks a long term data gathered at regular intervals is of vital importance. The identification of the causative agents is done by the combined efforts of various state and central government research facilities. Integrated Disease Surveillance Programme (IDSP) is a national agency which collects information on several diseases with the help of existing laboratory services in medical colleges and hospitals.⁵ Public health surveillance necessitates a continuous methodical case recognition, relevant sample collection and analysis in order to prevent viral diseases. Based on the data received the higher authorities could do the interpretation of data, planning, implementation, and evaluation of the programme initiatives to curb the infections.

The epidemiology of the deadly viral diseases needs to be studied in depth and there is paucity of data on epidemiology of the viral infections in India, particularly in the region of Punjab. The Viral Research and Diagnostic Laboratory (VRDL) at Government Medical College (GMC), Amritsar conducts the initial diagnosis of these viral infections during the outbreak/epidemic in Amritsar and neighbouring districts. The laboratory deals with diagnoses of all common viruses existing in the region like rubella, influenza viruses, hepatitis A, B, C, E and vector borne infections like dengue, chikungunya, Japanese encephalitis. The present paper reports the various occurrences of these viral diseases along with the demographic and geographical data of the patients.

MATERIAL AND METHODS

The present study was a prospective study done on the blood samples from a total of 5502 patients suspected of various

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How to cite this article: Tuli AK, Sidhu SK, Singh K, Oberoi L, Singh N. Seroprevalence of various viral diseases in various districts of North West Punjab. International Journal of Contemporary Medical Research 2021;8(1):A10-A12.

DOI: <http://dx.doi.org/10.21276/ijcmr.2021.8.1.5>



viral diseases received at Viral Research and Diagnostics Laboratory (VRDL) located at tertiary care hospital from January 2018 to June 2019. Viral diseases to be tested on the samples received included dengue, chikungunya, hepatitis A, hepatitis B, hepatitis C, hepatitis E, herpes simplex, cytomegalovirus and rubella. The samples were tested by Enzyme linked immunosorbant assay (ELISA) for the detection of IgM antibodies of chikungunya, hepatitis A virus and hepatitis E virus, IgM antibodies and NS-1 antigen of dengue virus, anti-HCV antibodies of hepatitis C virus, surface antigen of hepatitis B virus, IgG and IgM antibodies for cytomegalovirus, herpes Simplex and rubella virus. All the tests were carried out following the kit manufacturer's instructions.

RESULTS

Out of the total 5502 samples 2942 (53.47%) cases have been reported to be positive for one or more of these viral infections [Table1/Fig-1]. It is noteworthy that the HCV is predominant in the studied districts with a total of 1850/2269 (81.53%) subjects positive for anti-HCV antibodies. It is followed by Dengue 548/1031 (53.15%), HSV 238/764 (31.15%), HEV 108/507 (21.30%), HBV 68/189 (35.97%), followed by HAV 51/529 (9.64%), Rubella 40/94 (42.55%) and CMV 39/119 (32.77%). The present study reports 04 outbreaks of Dengue virus from the district of Amritsar,

Pathankot, Gurdaspur, Tarn Taran.

DISCUSSION

Due to extremes of geographical and climatic diversity, India faces a constant threat of emerging and re-emerging viral infections of public health importance. The disease surveillance system in our country needs to be strengthened putting more focus on the epidemiology and disease burden. There is also a persistent need to gain detailed understandings of disease vector biology and environmental factors influencing the emergence of viral diseases. Very less data is available on the seroprevalence of viral diseases which needs to be studied in depth.

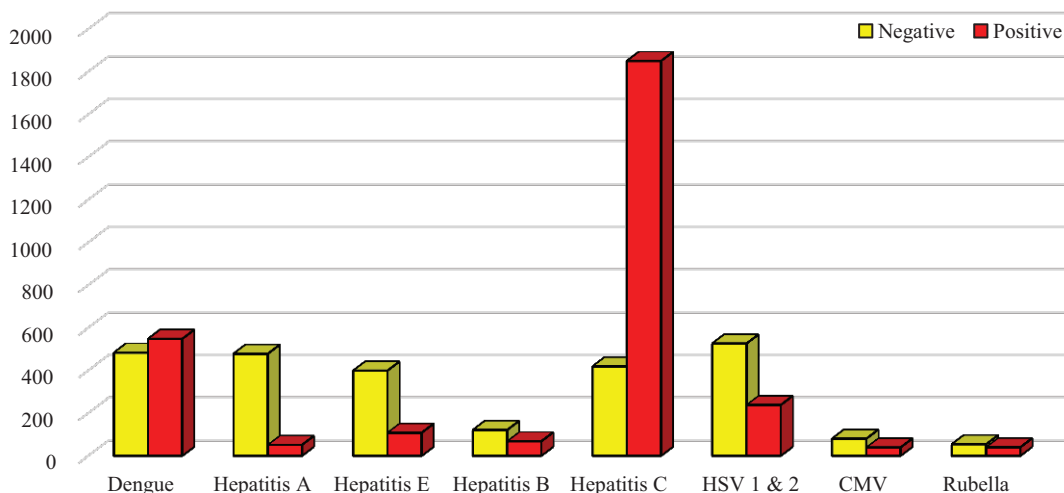
Information about seroprevalence of dengue in the general population is a useful indicator for measuring endemicity of dengue fever. The present results show that the overall seropositivity of dengue suspected cases is 53.15% (548 out of 1031). A study done by Manoj V Murhekar et al encountered the overall seroprevalence of dengue viral infection in India to be 48.7%.⁶ In another study done by Ukey PM et al., reported 31.3% patients to be serologically positive for dengue infection from Central India⁷ and Tamil Nadu based study reported 32.1% seropositivity.⁸ Increased seropositivity in our study can be due to climate change, globalization, travel and trade which is more in the city of Amritsar, and also it can be due to viral evolution.

In our study HBV is reported to be responsible for 35.97% of cases of patients suspected clinically with viral hepatitis. In India, the prevalence of HBsAg is reported to be 3-4.2%⁹ which is quite lower than reported in our study which can be due to the testing being done on the patients clinically suspected of acute viral hepatitis and not done as a screening test.

In the present study, anti-HCV antibodies were detected in 81.53% of patients. In India, general prevalence of HCV was 0.5% to 1%.¹⁰ Prevalence of anti-HCV in blood donors in developed countries range from 0.4-2%.¹¹ The reason for such high prevalence in our study could be due to the free drug initiative taken by the Punjab government under "Mukh Mantri Punjab Hepatitis-C Relief Fund Scheme (MMPHRF)

Virus	Total samples tested	Positive/suspected cases
Dengue Virus	1031	548 (53.15)%
Hepatitis A Virus	529	51(9.64)%
Hepatitis E Virus	507	108 (21.30)%
Hepatitis B Virus	189	68 (35.97)%
Hepatitis C Virus	2269	1850 (81.53)%
Herpes Simplex (1 and 2)	764	238 (31.15)%
Cytomegalovirus	119	39 (32.77)%
Rubella Virus	94	40 (42.55)%
Total	5502	2942 (53.47)%

Table-1: Distribution of serologically positive samples out of the suspected samples



Graph-1: Distribution of serologically positive samples out of the suspected samples

in which patient has to just pay for the viral load and genotype while the treatment is absolutely free. This has probably led to a sudden rise in the number of cases being diagnosed with anti-HCV antibodies, although the true positive new cases would be far less than this.

In the current study the seroprevalence of HAV is 9.64% (51 out of 529 suspected cases). The seroprevalence of HEV is quite high as it was observed in 21.30% (108 out of 507 suspected cases). Both HAV and HEV infections are prevalent in personnel inhabiting crowded places and in areas of low socioeconomic development. These viruses are being transmitted from sub clinically infected persons to susceptible persons and with contamination of water supplies. Punjab is generally considered an area of low endemicity for hepatitis A in comparison to other Indian states.¹² In India, HEV is responsible for 50-70% of all cases of acute viral hepatitis and also, is responsible for large outbreaks with source of infection mainly being contaminated water supplies.¹³ The occurrence of large epidemics of HEV in disease-endemic areas, as it is the case in the present study, suggests the possibility of doubtful protection from the antibody, gradual decline in the protective level of the antibody or infection from divergent strains of the virus.

In the current study HSV has been detected in 31.15% (238 out of 764 suspected cases) by using the Elisa kit but we were not able to differentiate between HSV1 and HSV-2. Herpes simplex viruses (HSV) are amongst the most widespread causative agents of human viral infections. In the present study, Rubella virus has been detected in 42.55% of suspected cases. This study provided a picture of common viruses prevalent in the region. Viral research and diagnostic laboratory has become instrumental in detection of emerging and re-emerging viral diseases including outbreak investigation of communicable diseases. Rubella is another contagious viral infection in pregnant women that leads to the infection of a developing fetus, causing fetal death or congenital rubella syndrome.¹⁴

Cytomegalovirus is one of the most frequently encountered opportunistic viral pathogens in immunocompromised individuals. Primary CMV infections are usually asymptomatic however, the incidence and spectrum of disease in immunocompromised people establish this virus as an important human pathogen.¹⁵ This study showed seropositive rate of 15.4% for the CMV specific IgM antibodies and 65.0% for CMV IgG antibodies. Previous study from the same institute in 2016 showed seropositive rate of 52.9% for the CMV specific IgM antibodies, thus indicating a higher prevalence in and around Amritsar.

Conclusion: Emerging and re-emerging infectious diseases are becoming an increasingly important area of concern in public health. More studies need to be done to study the pattern of the emerging and re-emerging pattern of the diseases.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 25-11-2020; **Accepted:** 27-12-2020; **Published:** 30-01-2021