**Original Research Article****DOI: 10.26479/2019.0502.39****A FIVE-YEAR DEMOGRAPHIC STUDY ON INFECTION OF HIV, HEPATITIS B AND C IN DONATED BLOOD****Arpita Chatterjee^{1*}, Tapas Kumar Karan²**

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ABSTRACT: A demographic investigation was performed to study the infection caused by HBV, HCV and HIV for the successive five years in the donated blood of a tertiary blood bank of southern West Bengal. Most sensitive and specific ELISA test protocol was used to detect HBV, HCV and HIV1/2. The incidence pattern of HBV virus was most threatening in all the years and it was more injurious in maximum period of time from 2011 to 2015 with highest peak in 2012. The HCV virus showed maximum infection in the year 2015. The number of people living with HIV was highest in 2013 and lowest in 2011.

KEYWORDS: Disease epidemic, demographic study, sexually transmitted disease, seasonal infection.

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1. INTRODUCTION

The Hepatitis B virus (HBV) is a member of the family *Hepadnaviridae*. It is transmitted parentally and it can produce either symptomatic or asymptomatic disease (carrier). Worldwide, an estimated 360 million people are chronically infected with HBV[1]. Every year over 100,000 Indians die due to illnesses related to HBV infection. The prevalence rate of HBV in India is around 4%[2]. Hepatitis C Virus (HCV) is a major cause of chronic active hepatitis, hepatocellular carcinoma and liver cirrhosis. HCV infection was first identified in 1988[3]. Transmission of HCV from infected mother to the infant occurs in about 5% of the cases and most patients with acute HCV infection have no signs or symptoms of infections[4]. At the beginning of 1986, despite over 20,000 reported AIDS cases worldwide, India had no reported cases of HIV or AIDS[5]. But now it was estimated that

around 2.4 million Indians are currently living with HIV[6]. The first case of HIV infection in West Bengal was detected in 1986. Although, individual states and cities have separate epidemics, but Andhra Pradesh, Goa, Karnataka, Maharashtra, Tamil Nadu, Manipur, Mizoram, Nagaland were vulnerable to HIV. Among the HIV infected people mitochondrial dysfunction in hepatocytes and other HIV infected cells is a leading cause of cellular death, but the more noticeable matter is that HBV is 50-100 times more infectious than HIV[2]. Blood transfusion is the secondary way for the transmission of sexually transmitted viral diseases like HBV, HCV and HIV. Thus it is a great duty for any Department of Transfusion Medicine to examine each and every blood before transfusion and take all the necessary safety measures for it. This test procedure should be quick and sensitive. Indirectly it also generates data on the incidence pattern of such diseases and their chance of epidemics. As India is a vast country, it is difficult to examine the severity of HBV, HCV and HIV in the country as a whole. Thus to obtain a more detailed picture of the crisis, individual epidemiological survey of each state is important not only to understand the severity but also to judge the changing spectrum of enraging severity. The present investigation aimed to study the infection of HBV, HCV and HIV in the donated blood in a tertiary blood bank of West Bengal.

2. MATERIALS AND METHODS

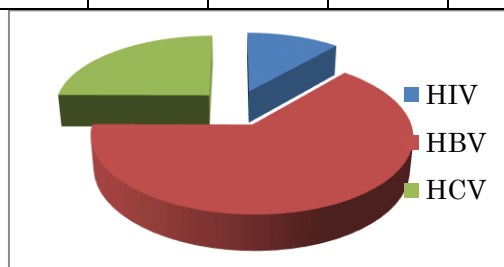
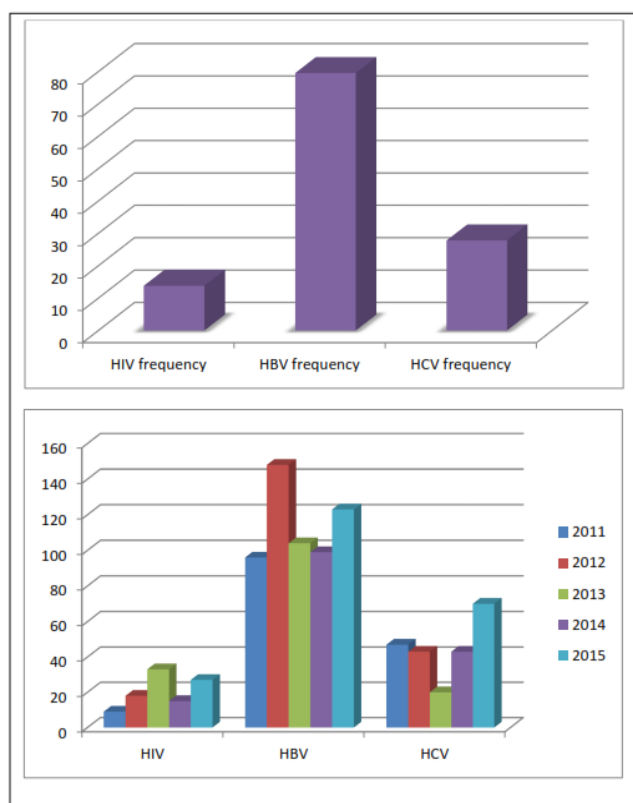
The demographic investigation was performed by detection of diseases for successive five years from 2011 to 2015. The study area included remote villages and farthest rural part of the southern West Bengal, particularly in the District of North 24 Parganas. The populations under study had diverse backgrounds, cultures and lifestyles. To facilitate large number of sample collection many mobile blood camps were organized by Barasat Cancer Research and Welfare centre, a tertiary health care centre of Southern part of West Bengal. The donors were also within age group of 18 to 65. Most sensitive and specific enzyme linked immuno-sorbent assay (ELISA) test protocol was used to detect HBV, HCV and HIV1/2 following the rules of Strategy I (highly sensitive), Strategy II (highly specific) and Strategy III (most sensitive). For detection of HBV the kit supplied by Qualisa HBV (Tulip Diagnostics, India) was used as per instruction of manufacturer. The test was further confirmed by the kits supplied by Biorad (USA). HCV infection was detected by the kits supplied by Qualisa HCV (Tulip Diagnostics, India). For the confirmation of HEP C the kit used was Genedia 3.0, Biorad (USA). For both the cases of HBV and HCV these were again verified by the kits of Microlisa (J. Mitra and Co., India). For detection of HIV the kit used was HIV 4.0 (Tulip Diagnostics, India). For confirmation study of HIV two kits were used namely Biorad Genscreen (USA) and Microlisa (Ag and Ab – P24) (J. Mitra and Co., India).

3. RESULTS AND DISCUSSION

A total of 42189 donors were assessed for the study for successive five years from 2011 to 2015. The occurrence of HBV infection was highest among all the disease taken into consideration in the studied population, followed by HCV and HIV (Table 1, Figure 1 and 2).

Table 1: Infection of HBV, HCV and HIV in donated bloods

| Year | Total sample | HBV infection | | | HCV infection | | | HIV infected blood | | |
|-------|--------------|---------------|--------|-------|---------------|--------|-------|--------------------|--------|-------|
| | | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| 2011 | 6097 | 89 | 7 | 96 | 33 | 14 | 47 | 8 | 1 | 9 |
| 2012 | 8316 | 125 | 23 | 148 | 30 | 13 | 43 | 14 | 4 | 18 |
| 2013 | 8606 | 90 | 14 | 104 | 12 | 8 | 20 | 29 | 4 | 33 |
| 2014 | 9490 | 86 | 13 | 99 | 28 | 15 | 43 | 14 | 1 | 15 |
| 2015 | 9680 | 110 | 13 | 123 | 4 | 2 | 6 | 15 | 12 | 27 |
| Total | 42189 | 500 | 70 | 570 | 107 | 52 | 159 | 80 | 22 | 102 |

**Figure 1:** Cumulative infection of HIV, HBV and HCV in total donated blood.**Figure 2:** Frequency distribution of HIV, HBV and HCV in total donated blood.

For the individual case the incidence pattern of HBV showed lower frequency in initial days with maximum fall during 2011 and it was further followed by maximum increase in the year 2012. A decline from earlier years was observed in successive years of 2013 and 2014, but in the year 2015 it showed an increase in incidence pattern. The present study revealed that HCV infection lowered

down during 2011 to 2013, but again it spread in 2014 and had its maximum increase in the year 2015. A chronological enraging severity was observed in HIV in the years 2011-13 with the highest incidence in the year 2013. Further it declined in the year 2014, but later rises in 2015 (Figure 3).

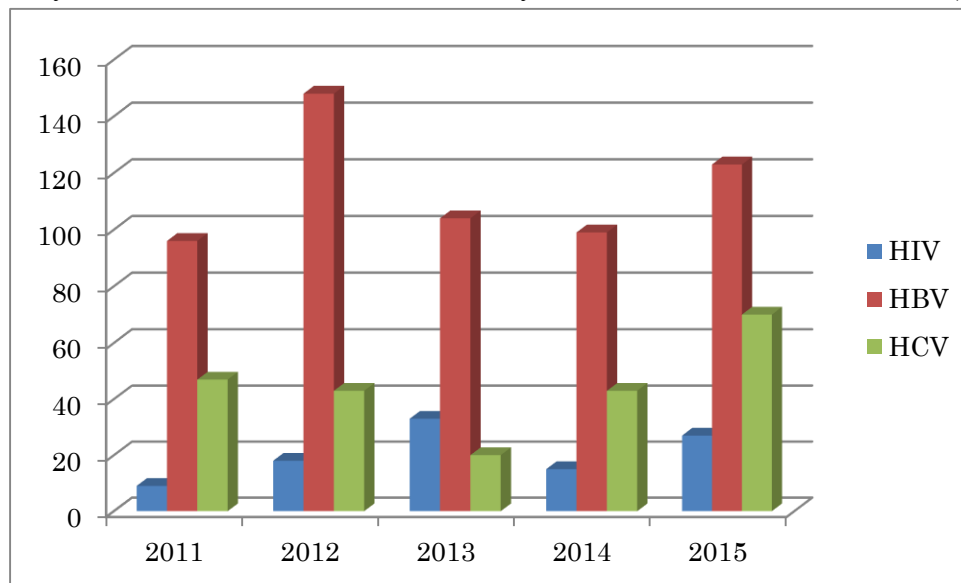


Figure 3: Comparison of HIV, HBV and HCV infection in donated blood from 2011-2015.

Gender wise incidence pattern showed that males were more infected in each case of HBV, HCV and HIV (Figure 4).

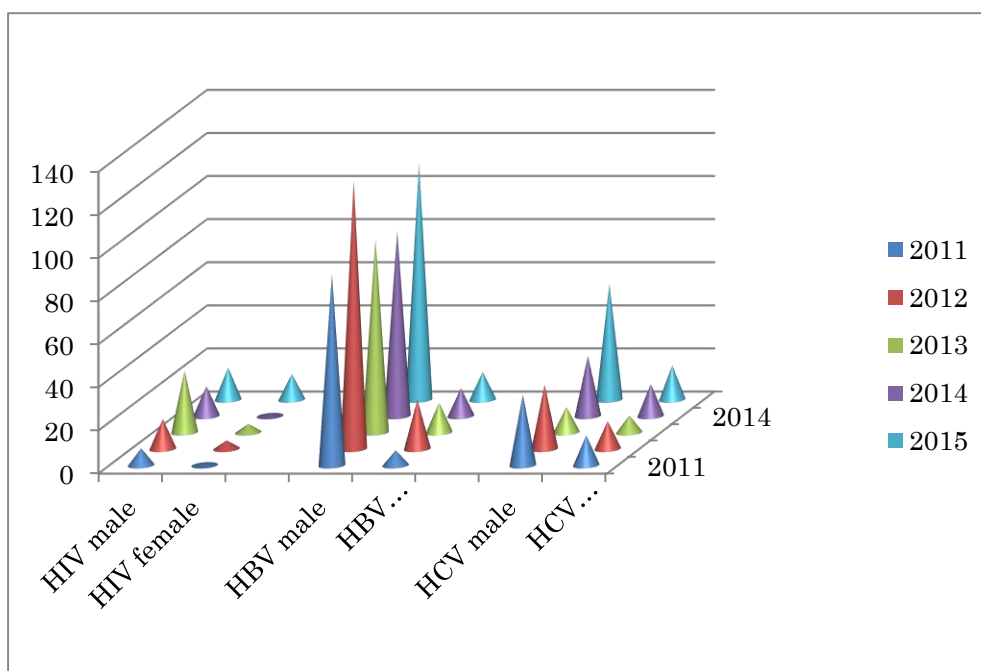


Figure 4: Gender-wise incidence pattern of HIV, HBV and HCV.

Seasonal distribution of HIV, HBV and HCV infection was observed by studying infection rate in every month from 2011-2015 (Figure 5). In the year 2011, in case of HBV and HCV the highest infection was observed in the month of August and lowest in June, whereas for HIV highest incidence was in the month of January 2011. In the year 2012, maximum incidence for HBV was at December, for HCV and HIV highest incidence was at August. In the year 2013, maximum incidence

of both HBV and HCV was at April, but for HIV maximum infection observed at February. In the year 2014, in all the cases of HBV, HCV and HIV highest infection was observed in the month of August. In the year 2015, HBV infection was maximum in January, HCV infection was highest in April, HIV infection was highest in December.

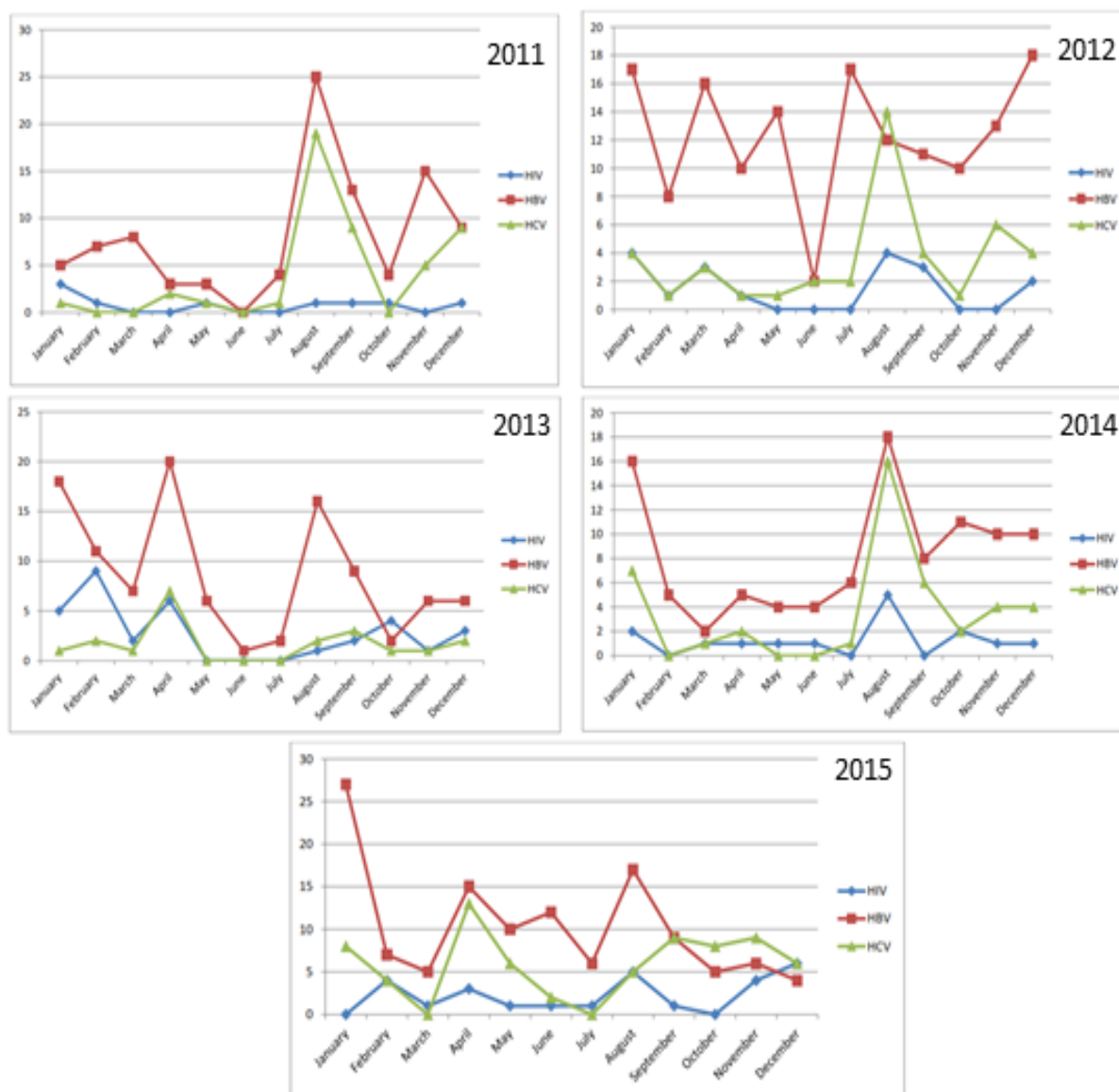


Figure 5: Seasonal distribution of HIV, HBV and HCV infection.

In a country like India where poverty, illiteracy and poor health are rife, the spread of sexually transmitted diseases present a daunting challenge. Today the epidemic affects all sectors of Indian society and has spread to the general population and even among people that had previously been seen as low-risk, such as housewives and richer members of society[8]. The present investigation revealed that among all the diseases undertaken, the incidence of HBV was posing a threat to the society with its increasing frequency rate. For these years, it was more challenging than HIV in the population studied. The HBV virus was more injurious for the greater period of time during 2011 to 2015. In the previous study, the number of Hepatitis B surface antigen carriers in India has been

estimated to be over 40 million[9]. The socio-economic status of the prospective person has an important bearing on the persistence of carrier state for HBV[10]. HCV infection affects 170 million populations worldwide[11] and according to WHO estimates the affected individuals are about two million[12,13]. Thus this study revealed that hepatitis infection should be taken more seriously than HIV infection in the rural population[14,15,16]. This observation supports the study of NACO suggesting that the number of people living with HIV has declined [17,18]. This trend may be due to successful prevention campaigns of various government, non-government and private organizations at different rural localities which made people aware to prevent this devastating sexually transmitted disease[19,20]. Although a study by the National Behavioural Surveillance Survey in 2001 revealed that 32.30% of female and 56.60% of the male respondents in the rural areas had knowledge about the sexual route of HIV transmission[6,21].

4. CONCLUSION

The occurrence of HBV infection was highest among all the disease taken into consideration in the studied population, followed by HCV and HIV, for successive five years from 2011 to 2015. Gender wise incidence pattern showed that males were more infected in each case of HBV, HCV and HIV. For the individual case the incidence pattern of HBV showed maximum increase in the year 2012, the HCV infection had its maximum increase in the year 2015. A chronological enraging severity was observed in HIV in the years 2011-13 with the highest incidence in the year 2013.

ACKNOWLEDGEMENT

Authors are grateful to the Administration of Barasat Cancer Research and Welfare centre, Banamalipur, Barasat, Kolkata, India, for their kind help and support in this study.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflicts of interest.

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