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Muhammad ZeeshanDepartment of Biotechnology, Abdul
Wali Khan University, Mardan,
Khyber Pakhtunkhwa, Pakistan**Ibad Ali**Department of Biotechnology, Abdul
Wali Khan University, Mardan,
Khyber Pakhtunkhwa, Pakistan**Arif Khan**Department of Biotechnology, Abdul
Wali Khan University, Mardan,
Khyber Pakhtunkhwa, Pakistan**Ali Muhammad**Department of Biotechnology, Abdul
Wali Khan University, Mardan,
Khyber Pakhtunkhwa, Pakistan**Zahoor Akbar**Department of Biotechnology, Abdul
Wali Khan University, Mardan,
Khyber Pakhtunkhwa, Pakistan**Muzammil Shah**Abasyn University, Peshawar,
Khyber Pakhtunkhwa, Pakistan**Ali Khan**Department of Biotechnology, Abdul
Wali Khan University, Mardan,
Khyber Pakhtunkhwa, Pakistan**Faheem Anwar**Department of Genetics, Hazara
University, Mansehra, Pakistan**Sajid Khan**Department of Chemistry, Abdul
Wali Khan University, Mardan,
Khyber Pakhtunkhwa, Pakistan**Jawad Khan**Department of Genetics, Hazara
University, Mansehra, Pakistan**Mahmood Khan**Department of Bioinformatics,
Hazara University, Mansehra,
Pakistan**Muhammad Usman**Department of Biotechnology, Abdul
Wali Khan University, Mardan,
Khyber Pakhtunkhwa, Pakistan**Corresponding Author:****Muzammil Shah**Abasyn University, Peshawar,
Khyber Pakhtunkhwa, Pakistan

Hepatitis B epidemiology and diagnosis in blood donors of district Mardan KP Pakistan

Muhammad Zeeshan, Ibad Ali, Arif Khan, Ali Muhammad, Zahoor Akbar, Muzammil Shah, Ali Khan, Faheem Anwar, Sajid Khan, Jawad Khan, Mahmood Khan and Muhammad Usman

Abstract

Hepatitis B is a chronic infection and is the main health concern especially in Asia, Africa, Southern Europe and Latin America and around two billion individuals are infected with HBV on the globe, among them 400 million are suffering from chronic HBV infection. Current data was collected from the period for December 2017 to October 2019 from the pathology lab of Mardan Medical Complex, Mardan. The blood samples of 31,367 blood donors were screened with ELISA kit (ARCHITECT i1000SR automated immunoassay analyzer chemiluminescent micro particle immunoassay). The occurrence rate of HBV infection amongst the blood donors was studied using CMIA method at Mardan Medical Complex, Mardan. 6253 blood donors were detected as HBV positive in total 31,367 blood donors. Total number of male blood donors was 28531, in which 5769 were HBV positive and their ratio was 20.22%, while the total number of female blood donors was 2836 in which 484 were detected as HBV positive and their percentage was 17.06%, which is fairly less than male positivity ratio. The total prevalence ratio is 19.23%. We concluded that the major cause of high prevalence of HBV is the blood transfusion and lack of awareness of HBV infection. Drinking and eating unhygienic water and food is another major cause of HBV.

Keywords: CMIA, mardan, blood donor, prevalence, HBV

Introduction

Blood transfusion and its services are lifesaving measures that commonly benefit most patient. Transfusion is still a crucial means of infection spreading to the recipients. In 2005, each WHO affiliate country signed a memorandum promising to provide safe and appropriate blood and its products to patients [1]. It can cause diseases such as hepatitis, syphilis, Aids, malaria, and many other diseases associated with viruses. The blood bank needs to assess HIV, HBV, HCV, Syphilis and Malaria [2]. Hepatitis B virus (HBV) has acquired the rank of universal community health threat among bloodborne pathogens by being the 10th key disease-causing mortality. Universally, HBV infects more than 2 billion people in which more than 350 million people are chronic carriers [3]. Currently, HBV is the main concern in people and medicines, especially in our undeveloped healthcare system which lack the appropriate safety procedures to avoid the risks of infection [4, 5]. In hospital-based and population-wide HBV reports, the estimated prevalence rate was 2-7%, placing Pakistan in the midway region of HBV prevalence. This risk has become much more critical in the past two decades because the prevalence of HBV has dramatically increased [6]. Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Human Immunodeficiency Virus (HIV) are three of the world's leading transfusion-transmitted infections (TTIs) agents. The World Health Organization (WHO) has valued 2 billion HBV-infected people, 200 million HCV-infected people, and 33.4 million HIV-infected people internationally [7, 8]. Hepatocellular carcinoma (HCC) is expected to progress more in patients with HBV than in patients with HCV [9]. In Pakistan, with a projected nine million people currently breathing with HBV, the frequency of HBV infection is gradually increasing [10]. Therefore, Pakistan, a rising nation with 190 million residents, faces a large socio-economic burden of infectious diseases. In addition to high incidence of anemia, infectious disorders, underfeeding, thalassemia, obstetric emergencies, shocking injuries and coincidences of road traffic the demand for blood supply increases under such circumstances, and blood transfusion is life-saving. According to an assessment, in Pakistan, three million blood donations are approved annually, but unfortunately the state agonizes

blood and blood component scarcity [7]. Studies are very unreliable, particularly in healthy people, to provide a clear picture of the incidence of HBV at the state level. Many of the earlier surveys focused on different small groups of people with few health signs and symptoms, so these findings do not necessarily replicate Pakistan's overall incidence [11, 12]. This study aimed at keeping an eye on the prevalence rate of HBV in the stated areas of KPK, Mardan and its bordering areas.

Materials and Methods

Area of study

The present study was conducted at Mardan Medical Complex in one of the KPK zones called Mardan. All the blood donors were belonging to district Mardan and its neighboring cities and districts. Mardan is about 60 km away from Peshawar which is the capital of KPK. A demonstration and observation base study was done from December 2017 to October 2019 a duration of round about two years.

Data collection and sampling

The blood donor samples were collected from Mardan Medical Complex's Pathology Laboratory, Mardan KPK, Pakistan. Chemiluminescent Microparticle Immunoassay (CMIA) was used to screen blood samples (ARCHITECT i1000SR automated immunoassay analyzer). All the information related to blood donor age, health and gender has been regularly documented.

Analysis of blood sampling

Chemiluminescent Microparticle Immuno-Assay (CMIA) is

reliable and precise standard technique. CMIA is the advance and modified form of the Enzyme Linked Immunosorbent Assay (ELISA) method. Architect system is designed to identify antibodies to apparent structural and nonstructural protein of HBV genome.

Data analysis

All tables and graphs have been developed using MS word and excel 2016. The data were tabulated and the tables were used to construct graphs.

Ethical committee approval

The survey was officially approved by the Ethical Committee of the Department of Biotechnology from Abdul Wali Khan University, Pakistan.

Results

Prevalence of HBV in district Mardan

A total of 31,367 blood donors were screened for anti HBV by (CMIA). We found that 6253 blood donors were HBV positive with prevalence ratio (19.93%). Out of total 28531 male blood donors, 5769 were detected as Anti HBV positive whereas 22762 were detected as Anti HBV negative and their percentage of prevalence was 20.22%, which was a bit high then the female blood donors. Though the number of female blood donors is very less than male blood donors which is 2836, in which 484 were detected as Anti HBV positive, but their percentage was high as compared to male blood donors which is 17.06%, whereas the remaining 2352 were stated as Anti HBV negative as shown in Table 1.

Table 1: Demonstration of HBV blood donor's prevalence in district Mardan.

Total blood donors	Positive Cases	Total Male/ive	Total Female/ive
31,367	6253 (19.93%)	28,531/5769 (20.22%)	2836/484 (17.06%)

Prevalence of HBV annually from 2017-2019

The current statistics were collected in the period from 2017 to 2019, and was distributed per annum. The occurrence of Hepatitis B in the year 2017, was 18.20%, (1138/6251), as shown in the figure. The prevalence was 19.96%, (3253/16293), in 2018 which was bit high compared to 2017. The occurrence rate was 15.61%, (1378/8823), in 2019 which is less than previous year (Fig. 1).

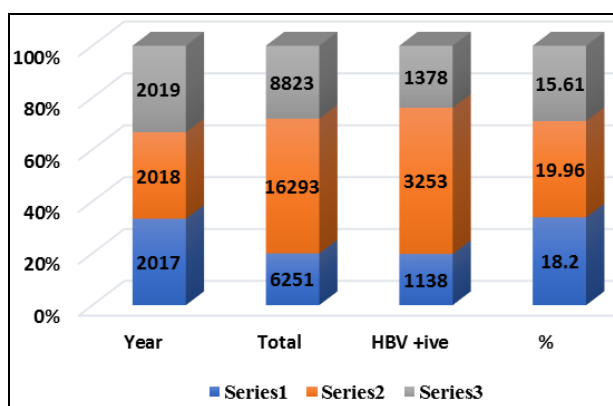


Fig 1: Year-wise prevalence of HBV.

Prevalence of Blood Donors in Mardan Age-wise

The current survey shows that the prevalence of Hepatitis B infection was highest in the age group 18-25, 22.98% (2683/11,673), the most important age group because all of these are youngsters, shadowed by the age group 35-45,

21.28% (1063/4993), other age groups are 25-35, whose prevalence ratio is 18.34%, (1974/10,760), and age group 45-55, their prevalence was 13.52%, (533/3941). All these results are shocking because the prevalence rate is very high in all these age groups. Fig. 2. Shows the prevalence in different age groups along with their percentage.

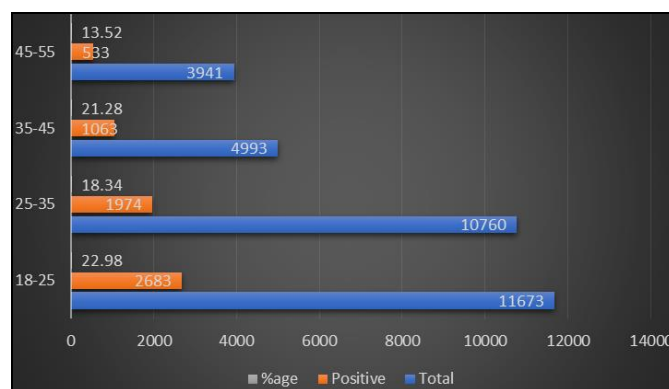


Fig 2: Age-wise prevalence of HBV

Discussion

The present study examined the prevalence of HBV in the KPK province of Pakistan in Mardan individuals and their neighboring areas. Out of 31,367 blood donors 6,253 blood donors were detected as Anti HBV positive showing prevalence rate 19.93%. The results obtained from this study shows that HBV prevalence is higher in male which is

20.22% (5769/28531) as compared to females which is 17.06% (484/2836). The current results are same like many other studies done in different zones of Pakistan as well as other countries which also displayed that the prevalence of HBV is higher in males as compared to females [13, 14, 15, 16]. For the current study, we categorized the blood donors in various age groups which are 18-25 years, 25-35 years, 35-45 years, and 45-55 years respectively. The prevalence rate was high in the age group 18-25 which was 22.98%, followed by the age group 35-45 years whose prevalence rate was 21.28%. Individuals in the age group 25-35 years reported a prevalence rate of 18.34% lower than the age group 45-55 years, the prevalence rate of which is just 13.52%. The total prevalence rate of HBV was found 3.0% in Mardan and it also showed that it was higher in females 3.2% as compared to males 2% [17]. Just like this another study was done by Khan *et al.* which showed that HBV is dominant on HCV in Mardan, KPK Pakistan [18, 19, 20, 21, 22].

In the Gulf regions of Arab, the average prevalence of HBV is stated to be between 2-7%. Although, in many other countries like Yemen and Sudan it can reach up to 16.9% to 21.3% respectively [23, 24].

An organized study was done on the analysis of HBV prevalence in Pakistan in 2011 which showed that the percentage of HBV infection was 4.3318%, in the healthcare persons, the percentage of military recruits percentage was 4.276%, pregnant women 5.872%, blood donors who were healthy 3.93%, liver disease patients 27.54% \pm 6.385%, patients with cirrhosis the prevalence percentage was 28.87%, those infected with Hepatitis their prevalence percentage was 15.896% \pm 14.824%, HCC patients percentage was 22% \pm 2.645%, multiple transfused patients prevalence was 6.223%, those who were using injectable drugs 14.95%, among the Ophthalmic patients 3.89%, in surgical patients 7.397%, in prisoners 5.75% [25].

As compared to the above studies done in different parts of KPK, the prevalence is in increasing order. The reasons for such situations may be the deficiency of health care facilities, illiteracy of HBV infection or due eating and drinking contaminated food and water. Likewise, the use of germ-infested things like needles and syringes or so many apparatuses are expected for the dispersal of HBV. As compared to the above studies done in different parts of KPK, the prevalence is in increasing order. The reasons for such situations may be the deficiency of health care facilities, illiteracy of HBV infection or due eating and drinking contaminated food and water. Likewise, the use of germ-infested things like needles and syringes or so many apparatuses are expected for the dispersal of HBV.

Conclusion

We concluded that illiteracy and blood transfusion are the main causes of HBV infection. The key reasons for HBV, occurrence includes drinking and eating polluted water and food. The health departments must recognize the preventive measures to control HBV through public campaign

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