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Chemiluminescent microparticle immunoassay-based detection on blood donor and incidence of HCV virus in district Mardan Pakistan

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Abstract

Background: Hepatitis C virus is main cause of persistent liver disease and developments toward liver cirrhosis, later a main cause of Hepatocellular Carcinoma. Round about 4% of the people is diseased by this virus around the world.

Method: The data was collected from the period for December 2017 to October 2019. Over all 32,012 blood donors blood samples were screened with the help of ELISA kit (ARCHITECT i1000SR automated immunoassay analyzer chemiluminescent micro particle immunoassay).

Result: The frequency rate of HCV infection among blood donor using CMA method at Mardan medical complex. From the total 32012 patients just 4587 cases were positive. The number of total male individual is 27079 and from total male individual just 4018 were positive which show (14.84%) ratio while the number of female individuals is 4933 and among total female case just 569 individual show positive result with percentage ratio is 11.53% which is quite less positive ratio than male positivity ratio.

Conclusions: we concluded that due to the blood transfusion and unawareness about HCV infection is the major cause of High prevalence of HCV. Another major cause is drinking and eating of unhygienic water and food also cause HCV.

Keywords: Cmia, mardan, blood donor, prevalence

Introduction

Medicinal treatment aims are used to maintain health and saving lives. Still medicinal treatment means can occasionally be actively or passively damaging to patients and might result in loss of life [1]. Every second person in universe require blood transfusion at least one or more than one time the medical circumstances in which blood transfusion is necessary are surgery and trauma including thalassemia, severe anemia, hemophilia, pregnancy problem and leukemia etc. Both of these are maximum public reasons in the developing nations [2]. Per annum 1.5 million person become diseased by blood transfusion. Though blood, can perform an important character in medicine and health care, it is also countable for the spread of many diseases [3]. A contaminated blood transfusion is very costly from human and financial point of view. The contaminated blood fetches its forthcoming in the form of prolonged illness and death, delayed viremia and many unseen conditions of illnesses, and distant reverberating penalties for the receivers as well as for their folks and citizens [4]. Bacteria, viruses, fungi and a lot of different parasites are conveyed through blood or through its stuffs. Hepatitis A, B, C, D, E, and G are the kind of viruses that can cause liver disease which is called liver cirrhosis and when there is no initial diagnosis and treatment done then the result death may occur [5]. The disease caused by Hepatitis C virus (HCV) is key universal health problem. Around 170 million populations are diseased with HCV in the globe, and this disorder is demonstrating that it is intensifying the financial, communal and fitness problem [6, 7]. Though the incidence of HCV disorder appears to have deteriorated in the previous two periods in the United States [8, 9], western and northern Europe [10, 11], Japan [12] and Australia [13]. Consciousness, enhanced care of blood stuffs, and the convenience of cheap and operative HCV treatments have proved knowingly in the deterioration of HCV in the upraising nations. Still, nonexistence of consciousness, insufficient blood screening services, nosocomial spread and deficiency of operative curing (because of so many reasons) have consequently been the main reasons accountable for apparently unstoppable upsurge in HCV disorder in most upraising

Nations [7, 14]. HCV is a member of the family *Flavi viridae* which has around 9.6 kb single-stranded, positive sense RNA genome [15]. Because of the underprivileged reliability of HCV RNA-dependent-RNA-polymerase (NS5B protein), the virus shows a raised level of sequence heterogeneity [15]. On the basis sequence homology six main HCV genotypes [1, 6], and many different subtypes (represented by a small English script suffixed next to genotype, e.g. 1b, 3a etc.) have yet been recognized [16]. The dispersal of HCV genotypes is very different. Genotypes 1-3 are dispersed universally while genotype 4 and 5 are limited to the Middle East and Africa, and genotype 6 is common mainly in the south-east Asian nations [17, 19]. Numerous surveys had recognized subtype 3a as the maximum incident HCV type in Pakistan [20, 21, 22, 23].

The purpose of this study was to keep an eye on the prevalence frequency of HCV in the stated zones of KPK, Mardan and its neighboring zones. Together with this amazing fact is that, all these results came in the healthy blood donors and by chance their blood test were positive before transfusion of blood. As HCV is fatal disease and it is spreading with a very high speed in the uprising nation especially in Asia. To appear the prevalence of this disorder and to update the public which is un-conscious of its signs and symptoms and to initiate medication on time to control this fatal infection.

Materials and Methods

Area of study

The present circumstance survey was performed in one of the zones of KPK named Mardan, at Medical Complex Mardan. All the blood donors were belonging to district Mardan, which is approximately 60 km away Peshawar the capital of KPK. A demonstration and observation base survey was done from December 2017 to October 2019 almost a duration of two years.

Data collection and sampling

The blood donor samples were collected from the Pathology lab of Mardan Medical Complex, Mardan KPK Pakistan,

blood samples were tested and screened through Chemiluminescent Microparticle Immunoassay (CMIA). (Architect i1000SR automated immunoassay analyzer). The info related to age, health and gender of Blood donors were recorded on regular basis.

Analysis of blood sampling

Chemiluminescent Microparticle Immuno-Assay (CMIA) is reliable and accurate and standard technique. CMIA is the advance and modified form of the Enzyme Linked Immunosorbent Assay (ELISA) method. Architect system is designed to detect antibodies to reputed structural and nonstructural protein (NS4, NS3, HCr-43, C-100) of HCV genome.

Data analysis

All the graphs and tables were created using MS word and excel 2016. The information recorded and put into tabular form.

Ethical committee approval

The study was officially approved by the Ethical Committee of the Department of Biotechnology from Abdul Wali Khan Mardan Pakistan.

Results

Prevalence of HCV in district Mardan

A total of 32012 blood donor were screened for anti HCV by (CMIA). We found that 4587 blood donors were HCV positive with prevalence ratio (14.32%). Out of total 27079 male blood donor, 4018 were detected as Anti HCV positive while 23061 were detected as Anti HCV negative and their percentage of prevalence was 14.83% which was more high than the female blood donors whose percentage of prevalence was 11.53% but the number of female blood donors was very less as compared to male with 4933 and the Anti HCV positive cases were 569 while the 4364 were testified as Anti HCV negative as shown in the table.1.

Table 1: Representation of HCV blood donors prevalence in district Mardan

Total Patients	Positive Cases	Total Male/ +ive	Total Female / +ive
32012	4587 (14.32)	27079/4018 (14.83%)	4933/569(11.53%)

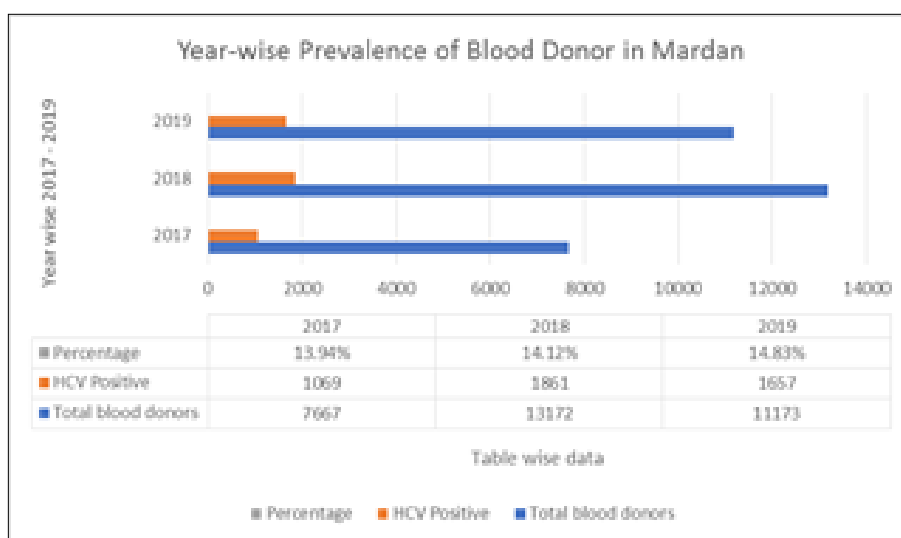


Fig 1: Years' wise prevalence of blood donors in Mardan

Year wise prevalence of HCV from 2017 - 2019

The present data was collected in the time interval from 2017 to 2019, and was divided annually. The prevalence of Hepatitis C in the year 2017, was 13.94%, (1069/7667), as shown in the figure 1. In 2018, the prevalence was 14.12% (1861/13172), which was high as compared to the previous year. In 2019, the prevalence rate was 14.83%, (1657/11173), as high as in the year 2018. In the figure 1 the data is arranged annually.

Age-wise prevalence of blood donor in Mardan

The present study revealed that the prevalence of Hepatitis C infection was on the peak in the age group 25-45, 16.68% (3062/18352), followed by the age group 45-55, 12.94% (387/2990), and the very important age group which include the youngsters, 18-25, their prevalence was 10.66%, (1138/10670) which is quiet alarming. On the basis of the present study the difference in occurrence of the disease in these age groups in human population may be due to genetic or environmental factors. The figure 2 shows the age wise prevalence & their percentage of the positive blood donors.

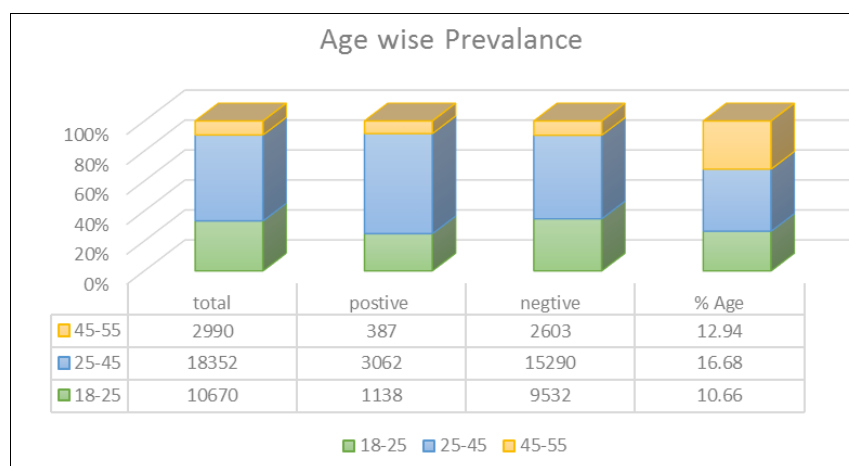


Fig 2: Age-wise prevalence of blood donor on district Mardan.

Discussion

Hepatitis C is tremendously concentrating issue for the public health and Pakistan is the 2nd highest state suffering from HCV in the world after Egypt. Due to poor health upkeep services, unclean conditions and lack of mindfulness in maximum parts of the nation, the proportion of HCV morbidity and mortality is higher. In Khyber Pakhtunkhwa, HCV has become a financial problem over population. In Previous studies conducted in Pakistan, different methods of selection of subjects supported the presences of high HCV percentage in Mardan ranging from of 1.2%, (54/4552). [24]. The present study shows that the prevalence of hepatitis C is on the peak in the people whose age ranges from 25-45, 16.68% (3062/18352), followed by the age group 45-55, 12.94% (387/2990), and the last group which include the youngsters whose age ranges from 18-25, the incidence was 10.66%, (1138/10670) which is quiet alarming. On the basis of the present study the difference in occurrence of the disease in these age groups in human population may be due to genetic or environmental factors. The figure 2 shows the age wise data of the positive blood donors and their percentage of prevalence. Previous studies done in Pakistan maintained the incidence of high HCV frequency extended from 3.3 to 5.3%. [24, 25]. In 2019, 11173 blood donors were analyzed and the number of positive cases was 1657 i.e. they were infected with HCV and prevalence percentage was 14.83%, which is high as compared to the previous year. In this study we investigated all the HCV patients' blood samples through ICT, while ELISA method confirmed that 3.16% of the total sample collected had anti-HCV antibodies. This study confirmed that the prevalence of HBV and HCV in mardan & Peshawar is different in different parts of the country and is smaller than our prevalence ratio [26, 27, 28, 29]. Several HCV prevalence are reported in 2019 (15.63%) in Mardan [30].

Conclusion

We concluded that the blood transfusion and unawareness of the HCV infection. Due to drinking and eating of unhygienic water are the fundamental reasons for HCV incidence. The public health department must recognition on the control of HCV via knowledge of the public and presenting higher fitness centers.

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