

Original Article

Seropositivity of Hepatitis C Infection Among Voluntary and Replacement Blood Donors in District Hospital, Hanumangarh.

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ABSTRACT-

Introduction: HCV is a causative agent of Post transfusion Hepatitis. Hepatitis C is a silent disease as remain asymptomatic in acute phase. Currently, Hepatitis C is the most common cause of liver transplant and a major problem around the world. Besides various route of transmission, the most common source for Viral Hepatitis C (VHC) transmission is the blood transfusion. Among Blood donors, this infection is more prevalent in replacement donors than in voluntary donors.

Aims and Objectives: A cross sectional Hospital based study was conducted on 3209 healthy blood donors which include 2581(80.4%) voluntary donors and 628(19.6%) replacement donors to evaluate the HCV seropositivity in Dist- Hanumangarh and to assess the socio-demographic characters for Hepatitis C Infection. All the blood samples were tested for anti-HCV antibody by latest generation Enzyme Linked Immunosorbant Assay. The result of the study was analyzed statistically using χ^2 test.

Result: HCV seropositivity among 3209 blood donors were evaluated as 0.7%, this was significantly lower in voluntary than in replacement donors (0.7% v/s 1%). Maximum seropositivity was observed in male and age group of 20-29 years (1.11%, 17/1521).HCV was more prevalent among rural population in voluntary donors and in urban population in replacement donors. Seropositivity for male (voluntary v/s replacement) was not observed statistically significant.

Conclusion: The study concluded voluntary blood donation as a safe side so efforts are required to increase voluntary blood camp.

Key Words: Hepatitis C; Replacement blood donors; Seropositivity

Introduction

Hepatitis C is the casual organism of Hepatitis C infection which was previously known as Non A Non B Hepatitis. Approximate 170 million (2 to 3%) people worldwide have HCV infection. Blood transfusion is the main source for the spread of Hepatitis C virus and other related infection.

Hepatitis C Virus is a hepatotropic, positive sense single strand, enveloped RNA virus that belongs to the family flaviviridae. HCV was discovered in 1989. Hepatitis C virus causes both acute and chronic infection. Acute infections are usually asymptomatic and most do not lead to life threatening disease. About 30% (15-45%) of infected persons spontaneously clear the virus within 6 months of infection without any treatment. The remaining 70% (55-85%) of persons will develop chronic HCV infection. HCV can be transmit through little exposure of blood via different routes HCV is mainly occur through perinatal route such as past blood transfusion, intravenous drug abuse, unsafe

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medical practices and dental procedures, cosmetic product like tattooing and ear piercing, use of unsterilized medical or non medical devices.

The parenteral transmission is the most important route of transmission of HCV which occurs via transfusion of infected blood or blood product, intravenous drug use, unsafe therapeutic injections, occupational injuries or nosocomial transmission during health care related procedures such as surgery, hemodialysis and organ transplantation. Injectable drug use which is a predominant mode of transmission of HCV infection in developed countries but in India, unsafe therapeutic injections and blood transfusion are the predominant mode of HCV transmission.

Prevalence of HCV among blood donors in India range between 0.5% to 1.5%. It is higher in the northeastern part, tribal populations and Punjab and is lower in the western and eastern parts of the country. On the basis of data collected from blood bank, prevalence of anti HCV in northern state ranges between 0.29%-1.85%, in southern state 0.08%-1.4%, in north eastern state 0.27%-1.17%, in eastern state 0.31%-1.09%, in western state is 0%-0.9%. On the basis of studies, blood donors show wide range of HCV prevalence and this disparity reflects the difference in the nature of blood donor pool (voluntary, replacement or remunerated). (Pankaj Puri et al., 2014)

Method**Study Area and Period-**

The study was conducted in the blood bank of dist Hospital, Hanumangarh. The study period was conducted from 1 January, 2021 to 30 June 2021.

Study design and population

A cross sectional hospital based study was conducted on blood donors which includes voluntary blood donors and replacement blood donors. Study includes only healthy blood donors means those donors who were found to be fit with the questioning of donor registration form allow to participate in study. Donors with blood transfusion, comorbid condition, underweight and low hemoglobin level were excluded from study.

Data Collection

A brief explanation of the study objectives was given to the participants. Participants were asked to give their informed consent before any information was collected about them.

Specimen collection and processing-

From each participant, 5mL blood was collected using sterile capped tubes and centrifuged to separate out serum and stored at 2-8°C. Each specimen was then tested for

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anti-HCV antibody by TRUST well HCV IgG Enzyme Linked Immunosorbant Assay Kit (Athene-Dx Pvt.Ltd) which works on the principle of indirect ELISA. This solid phase ELISA detect IgG to HCV. During the processing, Test specimen is added to antigen coated micro well which interact to form Ag-Ab complex. After the complex formation, HRP-antihuman IgG conjugates is added to interact with complex and then washed. After removal of unbounded conjugates by washing, TMB substrate is added to reaction mixture which undergoes color reaction and presence of blue color indicates the presence of IgG antibody to HCV.

OBSERVATION & RESULT

Table no. 1 is showing baseline characteristic of participants and seropositivity of anti-HCV antibody.

Sociodemographic Variables	Voluntary Blood donors ELISA (%)	Replacement blood donors ELISA (%)
Age wise Trends		
<20 years	0%(0/103)	0%(0/13)
20-29 years	0.92%(11/1183)	1.78%(6/338)
30-39 years	0.36%(3/844)	0%(0/198)
40-49 years	0.56%(2/357)	0%(0/69)
≥50 years	1.06%(1/94)	0%(0/10)
Gender wise Trends		
Male	0.68%(17/2510)	1%(6/619)
Female	0%(1/71)	0%(0/9)
Regional Trends		
Rural	0.9%(14/1615)	0.60%(2/331)
Urban	0.31%(3/966)	1.34%(4/297)

In the present study, 3209 blood donors of mean age 30.52 ± 8.396 years were screened for HCV. Among these, 3129 (97.5%) were male donors and 80(2.5%) were female donor. 1946(60.7%) donors belongs to rural residency and 1263(39.4%) belongs to urban residency. Out of total donors, 80.4% were voluntary blood donors and 19.6% were replacement blood donors. Prevalence of HCV in replacement blood donor is 1% which is found greater than voluntary blood donors, 0.7%.

The overall prevalence among blood donor is 0.7%. Highest prevalence of HCV is seen in 20-29 years age group with 0.92% and 1.78% in voluntary blood donors and replacement blood donors, respectively as shown in **Table no 1**. **Table no 2** is showing

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an decreasing trends of HCV prevalence with advance age and this was calculated statistically significant by using chi square test.

Seropositivity of HCV among rural voluntary blood donors is greater than urban voluntary blood donors (0.9%> 0.31%) but in case of replacement blood donors, seropositivity of HCV is higher in urban area than in rural area (1.34%>0.60%) as shown in **Table no 1**. In the present study, **Fig no 2** is showing peak prevalence of HCV in male of both type of blood donors are 0.68% in VBD and 1% in RBD while the prevalence of HCV among female, 0% does not truly match with the finding of other studies.

Table no 2 showing HCV seropositivity with advance age by using chi square test

Age group	Frequency of HCV by ELISA positives(n)	Frequency of HCV by ELISA positives (%)	Chi square	P value
20-29 years	17	73.9%	29.696 ^a Degree of freedom =3	0.0001 Asymptotic significant
30-39 years	3	13.0%		
40-49 years	2	8.7%		
≥50 years	1	4.3%		

Fig no.1 shows age wise seropositivity of HCV in voluntary and replacement Donors.

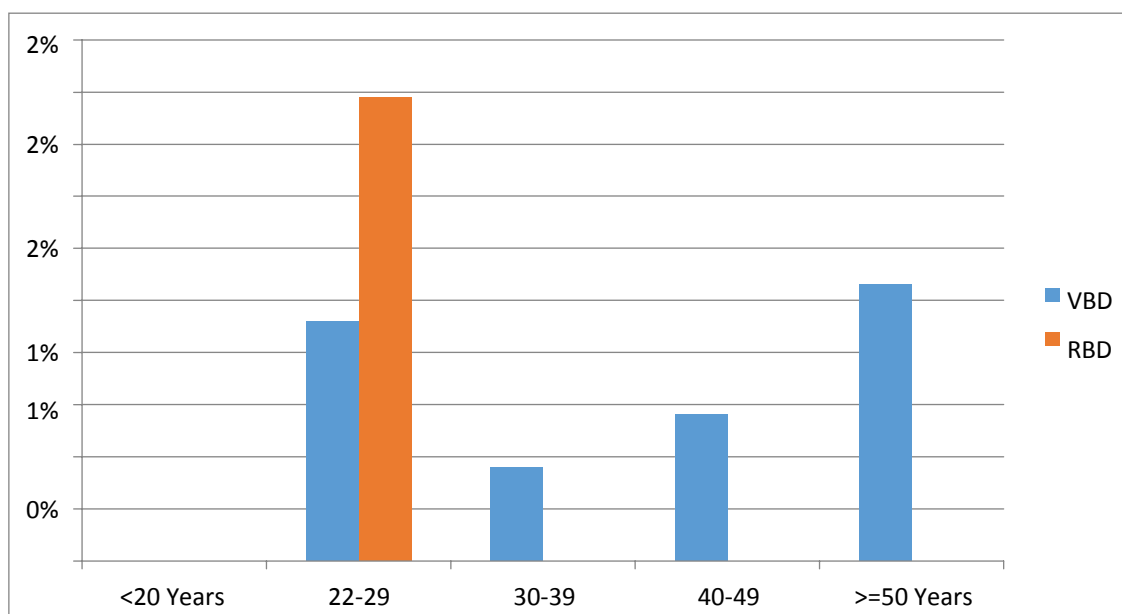


Fig no. 2 shows gender wise prevalence of Voluntary and Replacement Donors.

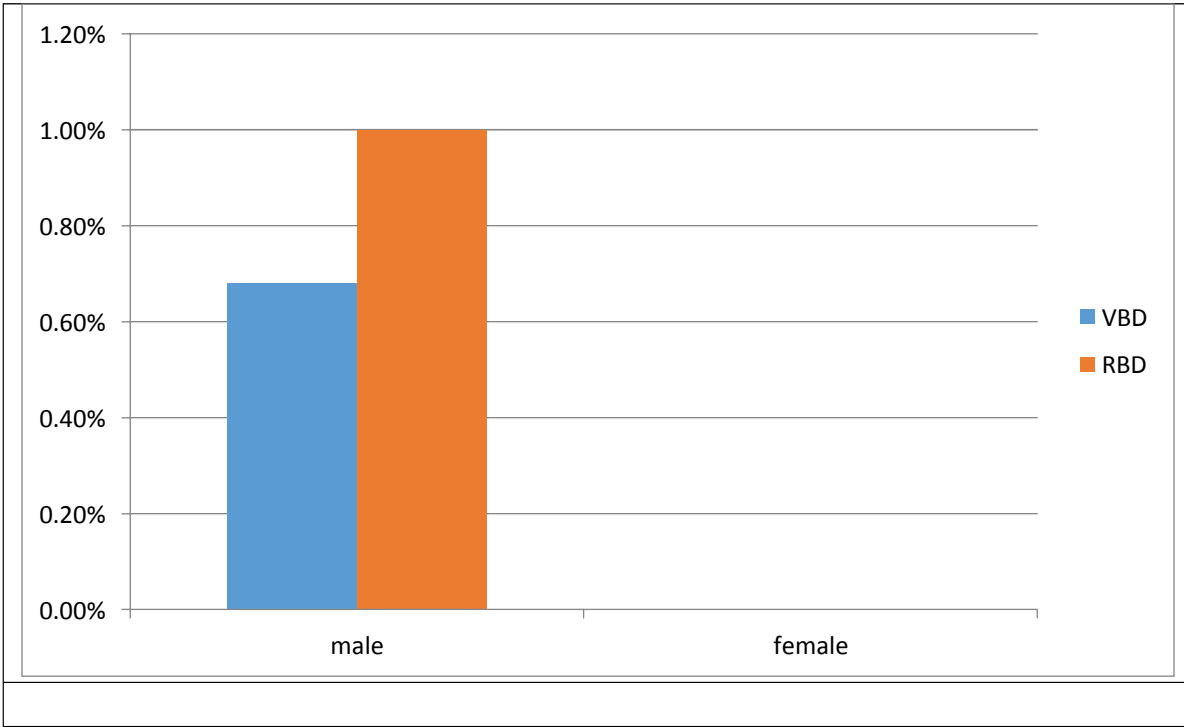


Table no 3 is showing difference of seropositivity of different age group and regional area of replacement and voluntary blood donors.

HCV seropositivity		P value	Statistical significance
AGE GROUP			
<20 years	RBD v/s VBD		
20-29 years		0.192	NS
30-39 years		0.401	NS
40-49 years		0.533	NS
≥50 years		0.743	NS
REGION			
Rural	RBD v/s VBD	0.629	NS
Urban	RBD v/s VBD	0.035	Significant
Replacement Donors	Rural v/s Urban	0.339	NS
Voluntary Donors	Rural v/s Urban	0.090	NS

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Discussion-The sero-prevalence of HCV in blood donors is raising an alarm to the blood safety (Basawaraj et al., 2014) The safety of blood and its product is a major problem in the area of transfusion medicine so it become mandatory to screen blood of donors. (Ibrahim et al., 2018) HCV is major disease that is transmitted through blood and sexual route in the world. The spread of Hepatitis C infection is increasing yearly in India. On the basis of National Indian Association for the study of liver, approximately 12.5 million Indian people are diseased with Hepatitis C, with mortality rate exceed one lakh.(noor jajan et al., 2016)The purpose of this study is to aware the people with the risk behavior and blood donor screening so as to prevent or reduce transmission of HCV.

This study was undertaken with the objectives of determining frequency in blood donors of Hanumangarh district.

Our sample size, 3209 for estimation of HCV prevalence lie close to the sample size 2384 recruited by Abate-Assefa et al(2013) , 3420 recruited by O.A.S. Wasfi and N. A. Sadek(2011), 1712 recruited by M M Hoque et al.(2021) and 4014 recruited by Rajni Sharma et al.(2007).The reason for the difference in the sample size of our study and other author's study may be due to the time period taken by them to study or it may be due to use of different sample size formula to calculate sample size at different Confidential interval and assumed prevalence of HCV. It may be due to the different method, they used to tabulate frequency like a cross sectional study or survey based methods.

In Our study, 80.43% were Voluntary Blood Donors (VBD) and 19.56% were Replacement Blood Donors (RBD) and this size of participants also matches with the studies of Dhar G et al., in 2013 enrolls 83.40% VBD& 16.60% RBD, Kumar et al.,in 2013 enrolls 80.8% VBD & 19.17% RBD, Dev Raj Arya et al., in 2016 enrolls 87% VBD & 13% RBD, D C Sharma et al., in 2014 enrolls 65.3% VBD % 34.7% RBD and Manjusha et al., in 2019 enrolls 91.63% VBD & 8.37% RBD where VBD participants are more in number in comparison to RBD participants.

The reason for this in our study is that more blood donation camp was organized by department as Voluntary blood donors are the cornerstones of a safe and sufficient supply of blood.

However studies of Pahuja et al.,in 2007 enrolls 99.48% RBD; Gagandeep Kaur et al., in 2010 enrolls 45% VBD & 55% RBD; Anuj Sharma et al., in 2014 enrolls 65.22% RBD & 34.78% VBD; Meena Sindu et al., in 2013 enrolls 91.9% RBD& 8.1% VBD; Sangita Patel et al., in 2013 enrolls 48% RBD & 52% VBD; Basawaraj et al., in 2013 enrolls 94% RBD & 6% VBD and Garg et al., in 2001enrolls 90.1% RBD & 9% VBD have reverse trends of participants to the present study of Government Hospital, Dist Hanumangarh as there are more replacement donor participants.

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The rate of infection of Hepatitis C in replacement blood donor is greater than voluntary blood donors (1% > .7%) in study done at District Hanumangarh, Rajasthan and this trend of prevalence in type of blood donor is consisted with studies of Pallavi et al., in 2011 (.23% > .20%); Anuj Sharma et al., in 2014 (1.37% > .23%); Manish Kumar et al., in 2019 (.27% > .06); Ibrahim et al., in 2014 (4.3% > .7%); Manjusha P Tambse et al., in 2019 (0.2% > 0.04%); Garg et al., in 2001 (3.52% > .27%); Arya et al., in 2016 (0.51% > 0.13%); Sangeeta Patel et al. in 2013 (0.24% > 0.18%) and Meena Singhu et al., in 2013.

In our study, the prevalence of HCV in replacement blood donor is approximately 1% which lies in close association with the study of Anuj Sharma et al., (2014), 1.37% in District Punjab and Noor Jahan et al., (2016), 1.2%.

Present studied prevalence among RBD is 0.77% higher than the Anti-HCV seropositivity reported by Pallavi et al., (2011); 0.731% higher than Manish Kumar et al., (2019); 0.8% higher than Manjusha et al., (2019); 0.49% higher than Arya et al. (2016)

The present prevalence of HCV (1%) in RBD is 2.52% less than reports of Garg et al., in 2001 and 3.3% lesser than Ibrahim et al., in 2014.

The present frequency of HCV in VBD is 0.7% which is found very close with the study of **Ibrahim** et al., in 2014(0.7%), Ghavanini and Sabri et al., in 2000(0.6%).

The present prevalence (0.7%) of VBD found to be 0.5% higher than the study of Pallavi et al., in 2011(0.20%); 0.47% higher than Anuj Sharma et al., in 2014(0.23%); 0.65% higher than Manish Kumar et al., in 2019(0.05%); 0.66% higher than Manjusha et al., in 2019(0.04%); 0.43% higher than Garg et al., in 2001(0.27%); 0.57% higher than Arya et al., in 2016 (0.13%); 0.4%, 0.6%, 0.61%, 0.5% higher than Meena Sindu et al., in 2013(0.3%,0.1%0.09%&0.2% in subsequent years study).

The reason for high prevalence of HCV among replacement blood donors than Voluntary blood donors is the concealment of medical history and life style as replacement donors are usually friends or relatives of the patients who need blood. It is the possibilities that donors hide their high risk activities from the relatives due to some social factors and thus become a risk factor for transmitting disease.

In the present study, Male donors were found to be actively participating with 97.5% in blood donation in comparison to the female (2.5%). In present study, male with 97.5% (3125) form a dominating participating donor group and female with 2.5%(80) form least participating donor and this is consistent with the participants recruited by Amit A Verma et al., in 2019 (97.72% male v/s 2.27% female), Sadhna Badge et al., in 2020 (98.05% male v/s 1.95% female), Dev Raj Arya et al, in 2016 (98.37% male v/s 1.63% female), Jein et al., in 2003(95.3% male) and Pahuja et al., in 2007 (97.24% male v/s 2.76% female). However in other studies as described above, the

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number of male participants are found as a predominating donors with >90% participation.

The reason for the less participation of female is unawareness, illiteracy and being anemic is a big problem in Indian women while some of the woman also found to be underweight due to which they are discarded as a donors.

In the present study, frequency of HCV among male is greater than female. Our study shows 0% prevalence of HCV in female donor and 0.7% among male donor participants.

In the present study, frequency of HCV in male is recorded as 0.7% which is high as comparison to female; resemble with the finding S R Patil et al., (2017) reports 0.67%, Amit A Verma et al.,(2019), Wang et al.,(1995) reports 6.5% and Songsvilai et al.,(1997) reports 0.389% among male.

Some of the studies show reverse trends with present study at Hanumangarh means prevalence among female is greater than male .These study includes Sylvester et al., (2017) reports 5% frequency of HCV in female in Ghana and Ajay Mathur et al., (2020) study report 0.03% among female in Rajasthan. However study of R N Makroo et al.,(2013) reports 0.69% and Aymard et al.,(1993) reports 0.3% show equal trends of prevalence of HCV among male and female.

Present study show the statistically insignificant relationship between male donors of both type blood donors which is concordant with the study of Basawaraj et al.,(2013) Ayolabi et al.,(2006) and Abate –Assefa et al.,(2013).

The reason for the high prevalence of HCV among male in our study is due to the more participation of male for blood donation, this results in more males to be tested, Hence more prevalence.

Secondly males are more involve in risk behavior than female, hence increases the chances of HCV Transmission among themselves and also to their counterpart.

Thirdly dominance of male may be caused by the factor affecting women like fear of blood donation, lower level of education and cultural restriction on social movements in India.

Fourth and the most common reason is the high incidence of anemia among Indian women which makes them to be rejected while being screened for blood donation.

The present study shows 0% prevalence for VHC (Viral Hepatitis C) which coincide with the finding of Shuvankar Mukherjee et al., (2020), Ayolabi et al., (2006), P a Saini et al. (2017) and Amit A Verma., (2019).

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The present study at government hospital of District Hanumangarh show high frequency of VHC in youth belongs to 21-29 years and 30-30 years of blood donors which matches with finding of Amit A Verma et al.,(2019); Basawaraj et al.,(2013); Anuj Sharma et al.,(2014); Purti Agarwal Saini et al.,(2017); A Jain et al.,(2003); Ayolabi et al.,(2006); Karki et al.,(2008); Javadzadeh Shahshahani H et al.,(2013); Shuvankar Mukherjee et al.,(2020); Fatemeh Farshadpour et al.,(2016) and C Pathak et al.

Current study show a decreasing trends of infection with advancing age from 21 years to > 50 years donors which is in concordant with C Patakh et al., Karki S et al.,(2008); A Jain et al.,(2003); R N Makroo et al.,(2013) and Basawaraj et al.,(2013) However reverse trend have also been noted in research article of P A Saini et al.,(2017); Abate Assefa et al.,(2013) and Sirchia et al.,(1990).

There have been found High VHC in 21-30 with 73.9% than 13.04% in 31-40 years donor out of total ELISA positive which resemble with the study of A Jain et al.,(2003); Karki et al.,(2008); C Pathak et al. and Shuvankar Mukherjee et al.,(2020) However a reverse trend have been noted in the studies of Javadzadeh Shahshahani H et al.,(2013); Ayolabi et al.,(2006); P A Saini et al.,(2017); Anuj Sharma et al.,(2014) and Amit A Verma et al.,(2019).

Our study show intermediate range of VHC in middle age donors (40-49 years) which coincide with the observance of Amit A Verma et al.,(2019); Anuj Sharma et al., (2014); P A Saini et al.,(2017); Ayolabi et al.,(2006); Shuvankar Mukherjee et al.,(2020) and C Pathak et al.

The decreasing trend with increasing age tested statistically significant in R N Makroo et al.,(2013) and A Jain et al.,(2003) study while statistically insignificant with Karki et al.,(2008) in Nepal and Basawaraj et al.,(2013) studies.

The relationship between age group and HCV prevalence observed statistically significant in studies of Abiye Tigabu et al., (2019) and Abate Assefa et al., (2013); Anuj Sharma et al., (2014) among RBD and Amit A Verma et al., (2019) which is opposed to the present study and statistically not significant with P A Saini et al., (2017) and Anuj Sharma et al., (2014) among VBD which matches with the present study.

In the present study and other author study, most of participants as donor belong to Youth category. The reason for this is more awareness, high literacy and less fear in youth population draw them towards blood donation. Their occur high prevalence of VHC in youth because of their indulgence in high risk behavior, unawareness towards the consequence of transfusion transmitted disease, lack of health education.

Present study shows frequency of HCV as 0.82% in rural blood donors and 0.5% in urban blood donors. In the present study rural population is more that is 60.7%

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comprising urban population that is 39.4% which lies close to the distribution pattern of Sukran Kose et al., (2014) and Noor Jahan et al., (2016)

The present study has opposite pattern of distribution of donors on the basis of place of residence than the Nicha Wongjarupong et al., (2021) Abo Amer et al., Anuj Sharma et al., (2014) .and M M Hoque et al., (2021)

The present study shows high VHC prevalence in rural individuals(0.9%) than urban individuals(0.3%) in case of VB donors this coincide with the finding of Anuj Sharma et al.,(2014)Present study show high HCV prevalence in rural area donors that is 0.82% than urban area donors that is 0.5% this is similar to the finding of R Kwizera et al., Nicha Wongjarupong et al., in 2021 (8% > 5.9%) ; Anuj Sharma et al.,(2014); Abo – Amer et al.,(2018); Damaty et al., in 2007 (14.1% > 6.8%) , Noor jahan et al., in 2016; Milkias Abebe et al., in 2020 (0.84% > 0.55%) and Pipat Luksamijarulkul et al., in 2002 (4.77% > 1.63%).

The reason for this can be explained by the insufficient information and maximum illiteracy among rural population.

Secondly, due to lack of medical facilities, most of them depend on quakes which do unhygienic health practices thus responsible for transmission of HCV.

Thirdly, use of unsterilized syringes, needles and surgical instruments in villages due to lack of facilities and lack of knowledge result in transmission of HCV in rural population at higher level.

Present study show insignificant relationship when the difference of rural subjects for HCV prevalence and difference between rural and urban HCV Positive were compared for both type of blood donors using chi-square test which is similar to the result of Sukran Kose et al., (2014); S S A Karim et al., (1993) and Anuj Sharma et al., (2014) study in RBD.

Present study is showing significant relationship in urban population for HCV seropositivity in both type of donors which coincide with Noor Jahan et al., (2016) highly significant association.

Conclusion-

Information so gained and data so collected were tabulated, analyzed and subjected to suitable statistical method (Chi-square test and Carl Pearson test, Mean, Standard deviation). Following conclusion was drawn from the study.

1. Maximum participating age group in blood donors belongs to 20-29 and 30-39 years of age.

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2. Male were predominant group as a participants of blood donors and opioid users as comparison to female.

3. The HCV positivity among 20-29, 30-39, 40-49 and ≥ 50 years of age group showing a **decreasing trends or inverse co-relation** among both blood donors (73.9%, 13.0%, 8.7%, 4.3%). This was found **statistically highly significant**

4. The least sero - positivity is observed among female blood donors so our study gives emphasis on the participation of more female in blood donation camps.

5. Study concludes higher HCV prevalence in Replacement donors than voluntary donors so give emphasis to organize voluntary blood donation camp to avoid transfusion transmitted disease.

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