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A Seroprevalent study of Hepatitis B, Hepatitis C and Syphilis among blood donors at a Tertiary hospital (Blood Bank) in Mathura and nearby districts
Running Title: Seropositivity prevalence of blood donors for infections

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ABSTRACT
Background: Blood transfusion has become a critical and life saving procedure of modern medicine. Infections transmitted through blood are the major issue of concern with blood transfusions. National Blood policy and the development of national blood programme under NACP aim to ensure adequate supply of safe and quality blood and its components which should be free from TTIs.
Aims and Objectives: The present study is aimed to determine the Seroprevalence of Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Syphilis (VDRL) among blood donors at a tertiary hospital (blood bank) in Mathura and nearby districts including Vrindavan, Mathura, Kosi and Chatta.
Materials and Methods: From January, 2019 to August, 2021 blood samples were examined retrospectively by using screening and confirmatory techniques to find out prevalence of Hepatitis B, Hepatitis C and Syphilis among blood donors. A total of 2741 samples obtained from donors were investigated.
Results: Of the 2741 donor samples, 1234 (45.02%) were voluntary and 1507 (54.97%) were replacement donors. Seroprevalent cases of all the TTIs in our study were 2.24%. Seroprevalence of HBV, HCV and VDRL was 0.25%, 1.3% and 0.66% respectively.
Conclusion: Our study showed greater prevalence of HBV and HCV than VDRL which is similar to other studies carried out so far . This study implicates that it is important to study a large population to elucidate better the epidemiology of HBV, HCV and VDRL and to analyze high prevalence area.

Keywords: Blood Transfusion, Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Syphilis (VDRL).

I. INTRODUCTION:

Blood donation involves collection, testing, preparing and storage of blood and its components. Blood donors can be voluntary that is voluntary donation of blood without any payment. A replacement donor is someone who donates blood by replacing the pool in blood bank so that the available units can be transfused to the patient who can be his friend or family member. Professional donors are those who donate their blood for money. It has been used since 1930. Though Blood donation is an important procedure, and integral to life saving, which carries the risk of transmitting life threatening transfusion transmissible infections such as HIV, HBV, HCV, Syphilis and Malaria.[1] As per the guidelines of WHO , all the blood donation must be screened for evidence of TTIs. This led to formulation of a national blood policy and development of a national blood program under NACP act. [2] NACP act ensures supply of safe and quality blood and its components collected from blood donors. Transmission of hepatitis via transfusion of blood and its products has been known since 1950. [3]. In the year 1965, Bloomberg discovered Hepatitis B surface Ag [4]. Hepatitis C virus was discovered in 1989 which is transmitted majorly through blood transfusion. Treponema pallidum, a spirochete, is the causative agent for syphilis. These organisms are transmitted via fresh whole blood and platelets. Though transmission of these organisms through blood is very rare, the main objective of screening donor blood for T. pallidum is to exclude donor with high risk behavior [5]. Estimation of some

regional level studies in India show approximately 40million people are found to be chronically infected with HBV and around 6-12 million people by HCV [6].

II. MATERIAL AND METHOD:

Type of study: Cross-sectional study design
Sampling method: Purposive sampling
Sample size: 2741 blood units
Time Period: Jan 2019 to Aug 2021
Methodology: Our study has been done on mandatory analysis of the blood collected from the blood bank of private tertiary hospital Mathura, U.P. A total of 2741 units of blood were collected from voluntary and replacement donors from Jan 2019, to August 2021. The age of studied donors ranged from 18 to 58 years. Most of the donors in our study were males. Units of blood collected during above stated time period were screened by ELISA Kit, (Enzyme linked immunosorbent assay) from J Mitra Co Ltd. For Screening of HbsAg, Hepacard was used, Antisera AntiHbsAg dispersed on membrane. For HCV, TRI- DOT TEST Device cards were used. Screening for syphilis was carried out by using rapid plasma reagin (RPR) card test from Beacon Diagnostics Pvt. Ltd. It employs detection of reagenic antilipoidal Antibodies. Confirmatory test for HbsAg was done by 4th generation HbsAg Hepelisa. 3rd Generation Anti-HCV ELISA test kits having a combination of Antigens with the sequence of both HCV structural and nonstructural Antigens were used since they increase the sensitivity and specificity. All VDRL reactive samples with a titre of more than / equals to 1:8 were considered as positive in order to remove false positive results. All the reactive blood samples were tested twice before being labeled as seropositive. All the seropositive blood units were first disinfected and later on discarded.

Method of Analysis: Data was entered in Microsoft Xcel spreadsheet. All the necessary percentages were calculated. For analysis we used chi-square test and z-test at 95% level of significance. Data has been represented diagrammatically with the help of bar chart and pie-charts.

III. RESULT

In our study, total numbers of donors were 2741. This includes 1,234 (45.02%) voluntary donors, 1507 (54.97%) replacement donors respectively [Table 1]. Almost all of them were males which outnumbered female donors. There were only 10 (less than 1%) females. As per guidelines, for selection of blood donors, the age should be between 18 to 60 years [5]. In our study, we followed the same criteria. Maximum of our donors were from 18 to 28 years of age (38%). Minimum numbers of donors were from 49 to 58 years of age (7 %) [Table 2] and [Fig. 1] Out of the 2741 cases, 168 were found to be infected with HBV, HCV and syphilis. [Fig. 2] Most of the seropositive cases fall under 18 to 28 years of age followed by only 5 patients who were between the age of 49 to 58years [Table 2] However, the proportion of donors who were seropositive in the age group 18-28 years were highly significant in such association. There was also a significant association with seropositivity among the age group 39-48 years. Out of blood donors in the age group of 18-28 years, corresponding to 38% of total donors, maximum, 61% were seropositive. Similarly 26% were seropositive in the age group 29-38 years corresponding to 35% of donors, but this association was not found to be statistically significant. According to area wise distribution of blood donors, we had maximum donors i.e. 1388 (50.64%) from District Kosi followed by Chatta, 545 (19.8%), Vrindavan, 383(13.97%) and then Mathura City, 270(9.8%), other areas 155 (5.86%)[Table 3] [Fig 3]. We found a highly significant difference in seropositivity among blood donors located in different source areas. Maximum seropositivity was found among donors from Mathura followed by other areas, then Kosi, Vrindavan, Chatta in descending order as shown in [Table 3]. Out of 2741 blood donors there were 168 seropositive cases of HBV, HCV and VDRL. There were 97 (3.5%) cases of HBV followed by HCV, 41 cases (1.4%) and lastly 30 cases (1.0%) were of syphilis. Seroprevalent cases of HBV were noted more in number among blood group of B positive. The Second most common blood group among HBV was A positive, followed by O positive and lastly AB positive respectively. Seropositivity of HCV was more among Blood group B, followed by O then A and lastly AB Positive sequentially. Whereas cases of syphilis were higher among blood Group of A positive and lower were in Blood Group AB Positive. This shows maximum seropositive cases were in blood group B positive and minimum were in AB Positive. HBV and HCV positive cases were prevalent in 6 donors with Rh negative blood groups.[Table 4].

IV. DISCUSSION

The risk of transfusion transmitted infections has been remarkably reduced since the introduction of serological screening.

This study was conducted retrospectively from Jan 2019 to August 2021 at a tertiary care

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hospital located in Mathura. Donors from Mathura and nearby districts were included in our study. More than half of the donors were from Kosi District [Table 3].

We had maximum number of male donors in our study. As compared to study done by Sangeeta Patel et al, female donors were approximately half among all the donors reported.[7] However, in our study, we had only 10 female donors that is less than 1% of the total donors studied.

Most of the donors in our study were in between the age of 18 to 28 years (38%).

Replacement donors (54.79%) constituted more than half of the blood donors in our study. As compared to annual report of Gujarat state AIDS control society (GSAC), 2010-2011 in which voluntary donors were 79%. In another study conducted by Col. R. Behl et al [8] 85.6% donors were replacement donors. This proportion was very high and not similar to our study.

Study on prevalence of HBV and HCV infection is needed to understand about its epidemiology and to create strategies to improve public health which may help in the disease prevention and control .[9] Our study showed more Seroprevalent cases of HBV in comparison to HCV and VDRL . These results are similar to other studies conducted so far.

V. CONCLUSION

Our study found high seroprevalence of Hepatitis B among the people donating blood in our hospital followed by Hepatitis C and Syphilis. Many young age donors were found positive. We need further investigation to elicit causes for a high seroprevalence that might affect this age-group viz; unsterile, unsafe injections, drug abuse, LGBT, heterosexual groups or poor immunization coverage.

Conflict of interest: None

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Table 1: Donor categories Distribution

Type of Donor	2019-2020	2020-2021	Till Aug 2021	Total	Percentage
Voluntary Blood Donors	1001	103	130	1234	45.02%
Replacement Blood Donors	1305	50	252	1507	54.97%
Total	2306	153	382	2741	100%

Table 2: Age wise Distribution of seropositivity among Blood Donors

Age in Years	No. of Donors (%)	No. of infected cases (%)	% of seropositive donors age wise	z-test statistic	p-value
18-28	1,025(37.39)	103 (61.31)	10.05	5.4	<0.0001
29-38	965 (35.21)	44 (26.19)	04.56	1.3	0.1909
39-48	559 (20.39)	16 (09.52)	02.86	3.0	0.0028

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49-58	192 (07.01)	05 (02.98)	02.60	1.8	0.0801
Total	2,741	168	06.13		

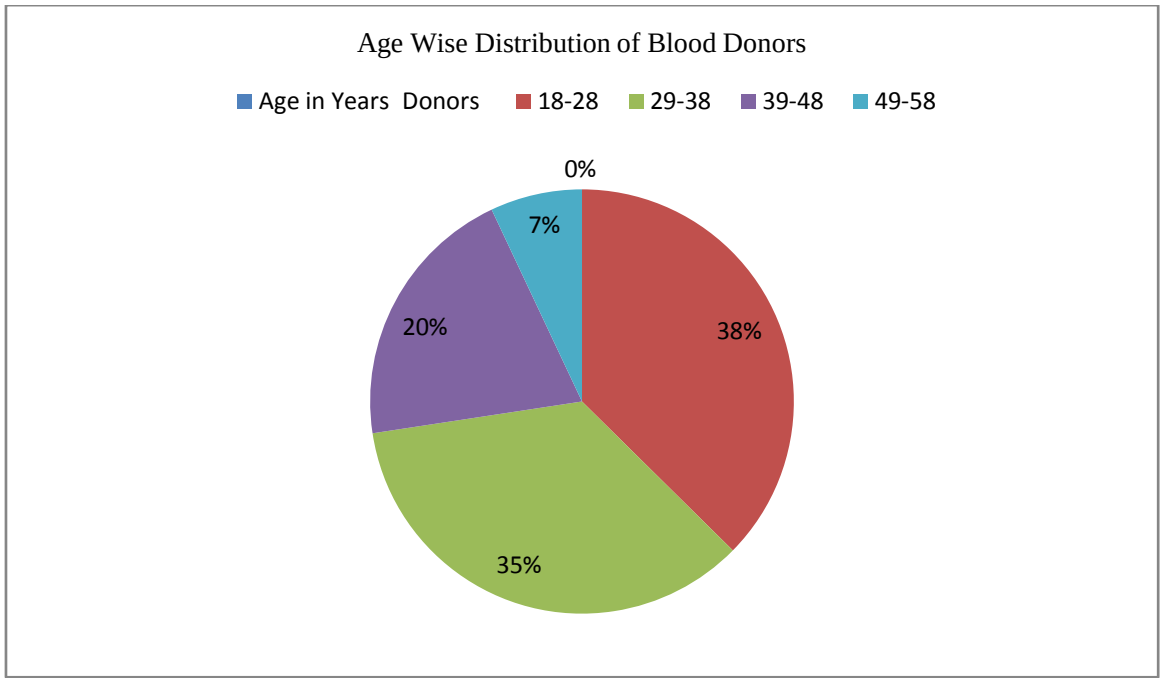

Fig 1: Age wise Distribution of Blood Donors

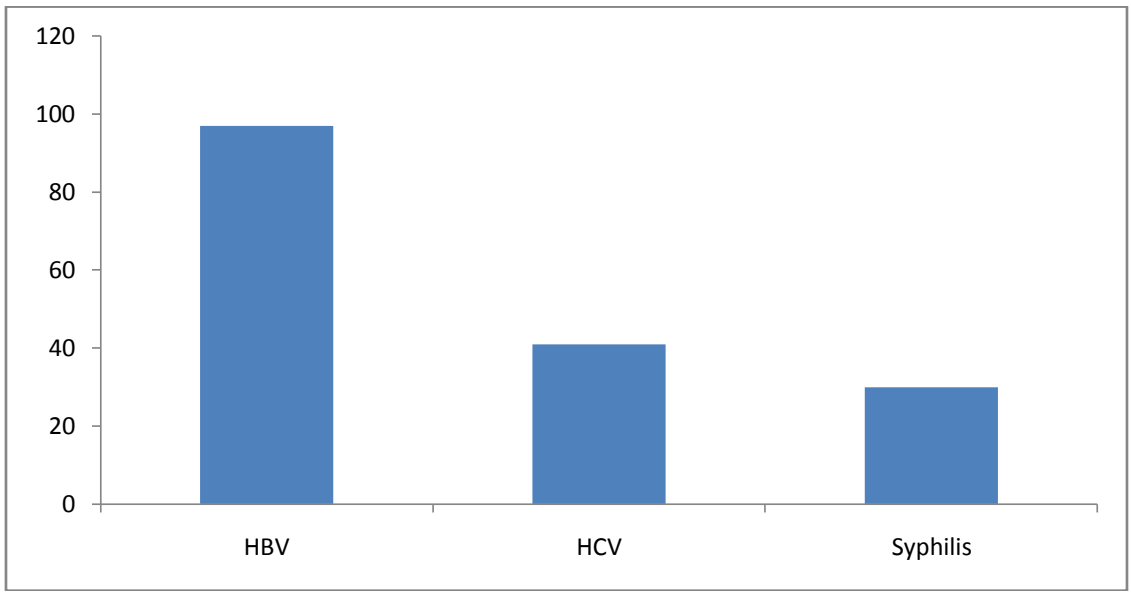

Fig. 2: Distribution depicting Seroprevalent cases among blood donors

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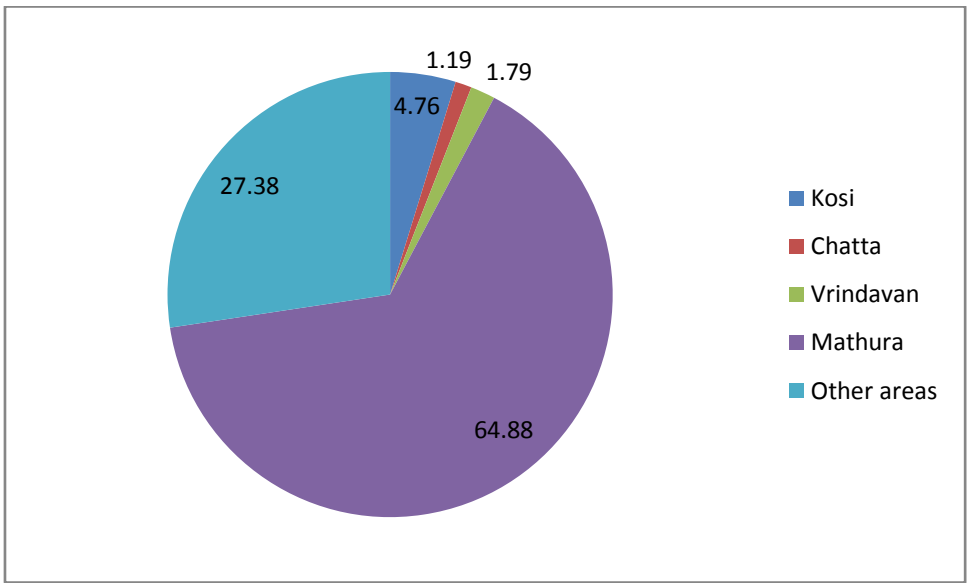

Fig. 3: Showing Area wise Distribution of Seropositive cases .

Table 3: Distribution of blood donors and their serpositivity according to their residence areas

Areas selected for study	No. of blood Donors (%)	Seropositive donors (%)
Kosi	1,388 (50.64)	8 (4.76)
Chatta	545 (19.88)	2 (1.19)
Vrindavan	383 (13.97)	3 (1.79)
Mathura	270 (9.85)	109 (64.88)
Other areas	155 (5.86)	46 (27.38)
Total	2,741	168

Chi-square statistic- 824.46, p-value <0.00001

Table 4: Distribution showing Blood Groups of seropositive cases

Seropositive Cases	Blood Group
O +ve	18
O –ve	04
B –ve	02
AB +ve	13
A +ve	17
B +ve	43
Total HBV	**97**
A+ve	09
AB +ve	03
B +ve	15
O +ve	14
Total HCV	**41**
A +ve	12
AB +ve	04
B +ve	08
O +ve	06
Total Syphilis	**30**