# THE STUDY OF SERO-PREVALENCE AND TRENDS OF HIV VIRAL MARKERS AMONG BLOOD DONORS IN NORTHERN INDIA

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#### ABSTRACT

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Transfusion of blood and blood components could be responsible for saving millions of life each year throughout the world. However, on the other hand, an improperly screened donated blood can be a source of transfusion transmitted infections (TTIs). Some important prevalent infections are caused by human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), *Treponema pallidum* and malaria parasite. To study the sero-prevalence and trends of HIV viral markers amidst blood donors in Northern India. The study was carried out in the blood bank section of Department of Pathology, Era's

Lucknow Medical College, Era University, Lucknow. The present study was conducted as a retrospective & prospective observational study. Retrospective data of past eight years before commencement of study (2008 to 2015) and prospective data of one and a half years (2016 and 2017) was used in the study. Data of 22192 blood donors was explored for the present study. Only 10 donors were found to be positive for HIV viral markers. Prevalence of HIV positivity was relatively much lower than that reported in contemporary studies. Nevertheless, the present study underscored the need to carry out screening of viral markers and their periodic audit in order to understand the changing trends of sero-positivity among blood donors.

KEYWORDS: Seroprevalence, HIV, Viral markers, Blood donors.

#### **INTRODUCTION**

Transfusion of blood and blood components could be responsible for saving millions of life each year throughout the world. However, on the other hand, an improperly screened donated blood can be a source of transfusion transmitted infections (TTIs). Some important prevalent infections are caused by human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), *Treponema pallidum* and malaria parasite.

HIV causes a dreaded disease known as Acquired immune deficiency syndrome. This infection is capable of causing prolonged viraemia and infectivity; and opportunistic infections.

India follows a mandatory policy for screening of blood donors for HIV; which includes elaborate medical history of the donors followed by preliminary clinical examination and then blood sampling is done to screen the infectious markers. Anti HIV (1 and 2) antibodies are the infectious markers which are screened The screening for these infectious markers is performed using rapid diagnostic tests and ELISA. In selected centres, nucleic acid testing (NAT) is also performed done.

Worldwide, nearly 38 million people are infected with HIV. Different parts of the world shows varied prevalence of HIV infection among blood donors ranging from 0.003% to 1.08%, respectively, as WHO reports.

Any infection may show wide range of variation in it's prevalence in different regions of a country. In different Indian studies, the sero-prevalence of HIV viral markers has been reported to range from 0.004% to 1.15% respectively (1,3,11), thus showing a high variability from centre-to-centre in different regions of India.

Hence, the present study was designed to study the sero-prevalence and trends of HIV viral markers among blood donors in Northern India.

#### AIM

To study the sero-prevalence and trends of HIV viral markers among blood donors in Northern India.

#### MATERIALS AND METHODS

### **STUDY DESIGN**

The present study was conducted as a retrospective & prospective observational study. Retrospective data of past eight years before commencement of study (2008 to 2015) and prospective data of one and half years (2016 and 2017) was used in the study.

#### SETTINGS

The study was carried out in the blood bank section of Department of Pathology, Era's Lucknow Medical College, Era University, Lucknow. The prospective time period for study was taken between July 2016 to December 2017.

#### **Inclusion Criteria**

Selection of blood donor is based on WHO/NACO/ AABB guidelines for blood donor.

#### **Exclusion Criteria**

Exclusion of blood donors is based on WHO/NACO/ AABB guidelines for blood donors.

#### **CLEARANCE AND APPROVALS**

Ethical clearance was taken from Institutional Ethical Committee, Era's Lucknow Medical College and Hospital, Era University, Lucknow. An informed consent was taken from all the donors.

#### SAMPLE SIZE

Sample size was calculated at the Department of Social & Preventive Medicine, Era's Lucknow Medical College & Hospital, Lucknow. Suggested sample size was 17000. The following statistical formulae have been used for calculation of sample size:

$$n = \frac{za^2 pq}{L^2}$$

Retrospective data was used by obtaining the permission of Hospital administration/Ethical committee while an informed written consent was taken from all the enrolled subjects who were interested for the participation in the study. All subjects were then be subjected to history and examination, after which they were investigated for all the parameter. 3 ml of blood is collected in plain vial for performing screening test for HIV viral markers. Screening for HIV was done using ELISA by ERBA kit.

### STATISTICAL TOOLS EMPLOYED

SPSS (Statistical Package for Social Sciences) Version 21.0 statistical Analysis Software was used to perform statistical analysis .The values were represented in Number (%) and Mean±SD.

#### RESULTS

The present study was conducted on blood donors to study the sero-prevalence and trends of viral markers among them. Retrospective data for past eight years (2008 to 2015) was explored along with data of current blood donors during the period of study (July 2016 to December 2017). Data of 22192 blood donors was explored for the present study. Majority of the data was obtained from the hospital records from 2008 to 2015 (70.5%). Out of 22192, 6543 (3575+2968; 29.5%) blood donors were enrolled during 2016-2017.

S.N.	Year	No. of cases screened	No. of cases Screened Positive	Positivity rate %
1.	2008	1029	0	0.000
2.	2009	1174	0	0.000
3.	2010	2249	0	0.000
4.	2011	1989	1	0.0503
5.	2012	2211	3	0.1357
6.	2013	2305	0	0.000
7.	2014	2397	1	0.0417
8.	2015	2295	0	0.000
9.	2016	3575	1	0.0280
10.	2017	2968	4	0.1348

Table 1: Yearwise Positivity Rate for HIV

$$\chi^2 = 13.665; p = 0.135$$



Fig. 1: Graphical Year Wise Percentage Screened Positive for HIV

HIV positivity rate ranged from 0% (2008, 2009, 2010, 2013, 2015) to 0.1357% (year 2012). Statistically, there was no significant difference in annual positivity rate for different blocked years (p=0.135).

S.N.	Marker		Statistical			
			Positive	Positive Negative		significance
		n	Mean±SD (Range)	N	Mean±SD (Range)	*p <sup>*</sup> value
1.	HIV	10	34.00±17.16 (22-80)	22182	28.83±7.94 (2-98)	0.039

#### Table 2: Association of Viral marker Positivity with Age (Student 't' test)

Mean age of screened population positive for HIV viral markers were  $34.00\pm17.16$  (22-80) whereas mean age of screened population negative for the same were  $28.83\pm7.94(2-98)$  showing a statistical significance of 0.039 thus mean age of patients positive for HIV viral marker was significantly higher as compared to those who were negative for these viral markers (p<0.05).

S.N.	Marker		Gender					Statistical
		Positive			Negative			significance
		n	Male	Female	N	Male	Female	'p' value
1.	HIV	10	10 (100%)	0	22182	21858 (98.5%)	324 (1.5%)	0.700

Table 3: Association of Viral marker Positivity with Gender ( $\chi^2$  test)

All the 10 cases which showed viral markers positivity were male, none of the female patient was positive for HIV viral markers.

S.N.	Blood Group	No. screened	No. Screened Positive	Screen positivity (%)
1.	A+ve	5100	4	0.0784
2.	A -ve	248	0	0
3.	B+ve	1989	3	0.0379
4.	B -ve	84	0	0
5.	AB +ve	7922	0	0
6.	AB -ve	389	0	0
7.	O +ve	6046	3	0.0496
8.	O -ve	414	0	0

Table 4: Association of HIV Positivity with that of Blood Group





# DISCUSSION

To preclude transfusion transmitted infections during blood donation, an essential facet is to screen the blood and its component properly. With advancement of good component therapy millions lives are saved but perilous transfusion practices leads to risk of TTI. Blood and blood components can cause transmission of certain infectious diseases like HIV, HBV, HCV, Syphilis, Malaria and many such kinds of blood borne infections in India. With this background, the present study was carried out with an aim to study the seroprevalence and trends of HIV viral markers among blood donors in Northern India.

In present study, the prevalence of HIV viral marker was found to be 0.05% only which were much lower (0.05% only) as compared to all the other studies, that reported it to range from 0.14% (Agarwal eta l., 2017)<sup>40</sup> to 0.44% (Pallavi *et al.*, 2011)<sup>1</sup>. As far as HIV prevalence is concerned, the present study had a much better picture which could be primarily to a lesser exposure to risk factors and increasing awareness against HIV risk in general population. As could be seen in different studies, that with the passage of time, a relative decline in HIV prevalence is general trend in different studies while Pallavi et al.<sup>1</sup> in their study conducted in the year 2011 had nearly 23% of seropositives as HIV positives, in later studies this proportion declined to reach to nearly 8.3% in the study conducted by Arora *et al.*<sup>42</sup> in the year 2017.

On evaluating the association of seroprevalence with age, gender and ABO/Rh blood groups we found a significant association of age with overall seropositivity rates for HIV. It was observed that HIV positivity rates were associated with significantly higher age. However, we did not find any such significant association of seropositivity with gender and ABO blood grouping. The distribution of HIV infection among individuals of different ABO blood types showed no statistically significant difference (p=0.36), implying that there was no association between the two conditions. This result is similar to the findings of many others studies (10-13). However, it is contradicted by the reports of Sayal et al. (8) and Ravizz and collaborators (9) which showed that patients with the blood group O and Rh positive were most susceptible to HIV infection

The present study provided useful information regarding the seroprevalence of viral markers in a facility from Lucknow in North India. One of the promising findings of present study was a relatively much lower HIV positivity rate among our donors as compared to previous studies from different centers across India. The time trends showed a fluctuating significant change in sero-prevalence thus indicate that screening for viral markers and their time trend studies are essential to study the prevalent viral markers posing risk to public health in general and also to ensure safe blood supply to the patients.

# CONCLUSION

The present study was conducted to study the seroprevalence and trends of HIV viral markers among blood donors in Northern India. Retrospective data of last eight years (2008-2015) and prospective data of 2 years (2016-2017) of blood donors at Era Medical College & Hospital was explored. Data of 22192 blood donors during the above mentioned period was explored. Out of 22192 blood donors, only 10 people were screened positive for HIV viral markers.

Observations of the present study lead to following conclusions. None of the blood donor was found to be HIV positive in 2008, 2009, 2010, 2013 and 2015, maximum 0.1357% blood donors (2012) were found to be HIV positive, followed by 0.1348% (2017). Difference in HIV positive during different years was not significant. Mean age of patients positive for HIV was significantly higher as compared to negative for these viral markers.

The findings of present study indicate that prevalence of HIV positivity was relatively much lower than that reported in contemporary studies. Nevertheless, the present study underscored the need to carry out screening of viral markers and their periodic audit in order to understand the changing trends of seropositivity among blood donors.

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