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SERO PREVALENCE AND EVALUATION OF TRANSFUSION TRANSMITTED INFECTIONS AMONG VOLUNTARY BLOOD DONORS IN A TERTIARY CARE CENTRE

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ABSTRACT

Background And Aim: Blood transfusion plays vital role in saving millions of life in emergency situations. It is associated with many risks including transfusion transmissible infections. Strict donor selection, effective and sensitive screening tests can reduce the risk of acquiring transfusion transmissible infections. The prevalence of transfusion transmissible infections in voluntary blood donors can also reflect the burden of diseases in the community. The aim of our study was to evaluate and estimate the prevalence of transfusion transmitted infections among voluntary blood donors. **Material And Methods:** This study was conducted for one and half year duration at GR medical college Gwalior. Sample size of study was 10500 of voluntary blood donors. Blood sample was taken from the tubing of blood bag and tested for Hepatitis B, Hepatitis C and HIV (Human immunodeficiency virus) by Sandwich Elisa method. Rapid card test method was used for testing of malaria. For Syphilis we do qualitative detection of treponemal antibody. **Results:** A total of 10500 voluntary blood donors were included in the study, out of which 277 donors were found to have transfusion transmitted infections (TTI) with prevalence of 2.638%. There were 10472 male donors and 28 female donors. Among the TTI donors HIV, HBV, HCV, Syphilis and Malaria infections were found in 5.1%, 73.6%, 6.1%, 14.8% and 0.4% cases respectively. The prevalence of HBV was highest. **Conclusion:** In this study high prevalence of HBV followed by VDRL syphilis, highlighted the importance of rigorous screening protocols, WHO (2010), to ensure blood safety. The observed gender disparity, with a marked male dominance, warrants further investigation into factors influencing female participation.

KEYWORDS : Voluntary blood donors, Blood transfusion, HIV, Hepatitis B

INTRODUCTION:

Blood transfusion is an effective palliative and therapeutic measure, however parenteral administration of blood and blood products carries a risk of transmitting infectious diseases. To ensure the safety of the blood transfused, governments of each of the countries have regulatory bodies at all state levels. A stable population of voluntary donors is very helpful as they serve as the source for safe blood. National blood systems are usually developed based on voluntary donors. The use of such donors would ensure the availability of safe blood. Actively, there has been an increase in the number of voluntary donors in different countries. [1]

Blood is considered a drug and all the amendments are made related to the Drug and Safety Act. The criteria considered for blood donation were laid in 1940's, which were amended in 1998. As per the new amendment, the donor should be in good health, mentally stable and should not have served imprisonment, drug addict and not have multiple sex partners. All the blood-related parameters should be normal and age criteria are fixed between 18 and 60 years. Any deviation from the normal conditions, the donor is deferred from donation. [2, 3]

TTI tests in blood donors are necessary to decrease the chance of transmission of infection and also to provide safe blood to the recipient so that there will be reduced mortality and morbidity, not only in patients but also for family, community, society and the general population. It also reduces the burden of disease in the country. This study will provide data that help to determine the current prevalence of transmission of TTI among blood donors so that it can be used to adopt measures to decrease the prevalence of TTI in the general population.

HBV, HCV, malaria, HIV and syphilis are the most common transfusion-transmitted infections because of prolonged viremia and carrier or latent state. A healthy voluntary blood donor screening procedure, donor selection and proper counseling of the donor will decrease the risk of acquiring TTI. This study was conducted on voluntary blood donors in a tertiary care centre in Madhya Pradesh. As per present guideline by National AIDS control organization (NACO) of India it is essential to test every blood and its component for HBV, HCV, HIV, syphilis and malaria.

AIMS AND OBJECTIVES:

This study was performed to estimate the prevalence of Transfusion Transmitted Infections among voluntary blood donors and to evaluate various factors associated with TTI.

MATERIAL AND METHODS:

This study was conducted for one and half year duration at GR medical college Gwalior. Sample size of study was 10500 of voluntary blood donors. After screening of blood donors, we had collected required amount of whole blood in 350/450ml CPD – SAGM (citrate phosphate dextrose – saline adenine glucose mannitol) Blood bag and took 3ml of anti-coagulated Blood from the tubing's of Blood bag. Sample was centrifuged at 1200rpm (Round per min.) for 3-5 min. Supernatant plasma was used for testing of transfusion transmitted infections. Sandwich Elisa method was used for testing of Hepatitis B virus, Hepatitis C virus and HIV (Human immunodeficiency virus). For Syphilis we did qualitative detection of treponemal antibody and for Malaria antigen card test.

RESULTS:

Table -1: Prevalence Of Transfusion Transmitted Infections Among Voluntary Blood Donors

Total voluntary blood donors at a Tertiary Care Centre	10500 donors
Voluntary blood donors with TTI	277 patients
% Prevalence of TTI	2.638%

This data highlights that while voluntary donors are generally considered lower risk compared to paid or replacement donors, there is still a measurable burden of TTIs in this group. Continuous screening and awareness efforts are essential to ensure the safety of the blood supply.

Table- 2: Gender- Based Prevalence Of TTI

Gender- based prevalence	Males	Females
Total voluntary blood donors at a Tertiary Care Centre	10,472.	28

Voluntary blood donors with TTI	276 (2.636%)	1 (0.0036%)
% Prevalence of TTI	2.636%	3.571%

The significantly lower participation of female donors also highlights a potential gender disparity in blood donation, which may warrant further investigation and targeted awareness efforts.

Table - 3: Age Group Distribution Of TTI Positive Cases

Age group (in years)	Frequency	Percentage
18-20	10	3.6
21-30	147	53.1
31-40	98	35.4
41-50	15	5.4
51-65	7	2.5
Total	277	100

Table - 4: Result Of Transfusion Transmitted Infections (TTI)

Result of TTI	Frequency	Percent	Valid Percent	Cumulative Percent
HBV positive	204	73.7	73.7	73.7
HCV positive	17	6.1	6.1	79.8
HIV positive	14	5.1	5.1	84.8
Malaria positive	01	0.4	0.4	85.2
VDRL Syphilis positive	41	14.8	14.8	100.0
Total	277	100.0	100.0	

The overall rate of transfusion-transmitted infections, especially hepatitis B, indicates a critical need for continued screening and donor education to ensure the safety of the blood supply.

Table- 5: Age Group Distribution Of TTI Positive Cases

Age group (in years)	Frequency	Percentage
18-20	10	3.6
21-30	147	53.1
31-40	98	35.4
41-50	15	5.4
51-65	7	2.5
Total	277	100

Table- 6: Age Groups And TTI Results Cross Tabulation:

Results of TTI	18-20 yrs	21-30 yrs	31-40 yrs	41-50 yrs	51-65 yrs	Total
Hepatitis B positive	10	106	70	14	4	204
HCV positive	0	14	2	0	1	17
HIV positive	0	8	6	0	0	14
Malaria positive	0	0	1	0	0	1
VDRL positive	0	19	19	1	2	41
Total	10	147	98	15	7	277

Chi-Square tests	value	df	P-value
Pearson Chi-Square	20.487[a]	20	0.428

The Chi-Square test result of p = 0.428 indicates no significant relationship between age group and TTI results

DISCUSSION:

This study reveals that the 21-30 years age group constitutes the largest segment, among TTI positive donors (53.1%). 99.6% of the positive donors were male and only 0.4% were female. This finding is consistent with studies by Allain, 2004 [4] and Schreiber et al., 2003 [5].

The results of TTI testing show a high percentage of HBV (73.7 %) and VDRL syphilis (14.8%). Lower percentage were observed for HCV (6.1%), HIV (5.1%), and malaria (0.4%) These findings highlight the importance of rigorous screening protocols, as emphasized by Dodd, 1992 [6] to ensure the safety of the blood supply. The high HbsAg prevalence also aligns with studies by WHO, 2010 [7] which highlight the importance of screening for HBV, HCV and HIV in blood donations.

The cross tabulation between age group and gender in the study revealed a predominantly male donor population, with 276 males compared to only 1 female. The majority of donors fell within the 21-30 age group, followed by the 31-40 age group. There was a significant skew towards male donors, a trend consistent with findings by Allain ,2004 [4]. The p-value of 0.766 indicates that there is no significant relationship between age group and gender among blood donors.

The cross tabulation between age group and history of transfusion-transmitted infections (TTIs) revealed that only 3 donors reported a history of TTIs, while the majority (274) had no such history. The p-value of 0.018 indicates a significant relationship between age group and history of TTIs. This finding is consistent with studies by Dodd (1992) [6], which emphasized the importance of donor screening to minimize the risk of TTIs.

Finally, in the cross tabulation of age group and transfusion-transmitted infection (TTI) results, it was found that HBV was the most common positive result (204 cases), followed by Syphilis (41 cases). The 21-30 and 31-40 age groups had the highest number of positive TTI results. The p-value of 0.428 indicates no significant relationship between age group and the result of TTI. However, the high HBV highlights the need for effective screening and prevention strategies to ensure blood safety, with comprehensive screening for HCV and HIV also remaining essential.

CONCLUSION:

The findings revealed that the majority of blood donors were young males, predominantly in the 21-30 and 31-40 age groups. Socioeconomic status varied, with a significant proportion of donors being laborers and farmers. The analysis of donation frequency indicated that most donors were first time or infrequent, underscoring the need for improved donor retention strategies. Marital status showed a higher prevalence of married donors. The high prevalence of HBV followed by syphilis, highlighted the importance of rigorous screening protocols, WHO (2010), to ensure blood safety. Statistical analysis, including chi-square tests, revealed significant associations between age group and factors such as socioeconomic status, occupation, marital status, and history of TTIs, while also showing non-significant relationships between age group and gender, number of donations, and TTI results. The observed gender disparity, with a marked male dominance, warrants further investigation into factors influencing female participation. The study's identification of risk factors, including age and socioeconomic variables, provides valuable insights for targeted interventions to enhance donor recruitment and ensure the safety of the blood supply.

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