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ORIGINAL ARTICLE

Seroprevalence of Transfusion Transmitted Infections in Healthy Blood Donors in Specific Class of Kuppuswamy's Socio-Economic Status Scale

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ABSTRACT

Background: Blood transfusion has profound role to play in specific illness, but still due to unsafe and careless practices the peril of transfusion transmissible infections (TTIs) such as human immunodeficiency virus (HIV), hepatitis C virus (HCV), hepatitis B virus (HBV), syphilis and malaria prevails.

Objective: To study the seroprevalence of TTIs in healthy blood donors in specific Kuppuswamy's socio-economic scale at a Blood Bank of a tertiary care teaching hospital in north India, to enhance the awareness about transfusion related risks and to implement better strategic measures to prevent TTI, in high risk groups.

Material and Method: Total 10,569 blood units were collected from Jan-2014 to Septmeber-2015. All donors were categorised according to the Kuppuswamy's Socio-economic Status Scale (KSESS) followed by screening of all sera samples for hepatitis B surface antigen (HBsAg), antibodies to HCV, HIV types 1 and 2 using enzyme-linked immunosorbent assays (ELISA) and for malaria antigen and *Treponema pallidum* by using immunochromatographic tests and Rapid Plasma Reagin test (RPR) respectively. All the samples found reactive for HIV, HBsAg, and HCV were again confirmed by second ELISA.

Results: The overall seroprevalence was HCV 2.06 % (218/10569) > HBV 1.71% (181/10569) > HIV 0.03% (3/10569). No donor was found positive for Malaria and VDRL. The prevalence of transfusion transmissible diseases in specific socio economic class was as follows-:Upper lower class (IV) 248/2261 (10.96%) > Lower class (V) 34/483 (7.03%) > Lower Middle class (III) 97/5789 (1.67%) > Upper middle class (II) 22/1552 (1.42%) > Upper class (I) 1/484 (0.20%) and seroprevalence of transfusion transmissible diseases in each socio economic class, out of total donations was as follows-: Upper lower class (IV) 248/10569 (2.35%)> Lower middle class (III) 97/10569 (0.92%) >Lower class (V) 34/10569 (0.32%)> upper middle class (II) 22/10569 (0.21) >Upper class (I) 1/10569 (0.009%).

Conclusion: Maximum positive TTIs had association with low socio-economic status people with increased medical and behavioral risk factors. Hence, we conclude that awareness among the high risk population group, strict and skillfulness selection of donors and use of effective laboratory screening tests is the prerequisite for the safe donation!!

INTRODUCTION

Albeit transfusion of blood have profound role to play in specific illness, still due to unsafe, unaware and careless practices safety of blood transfusion is a major public health issue. Thus, according to NACO guidelines, all mandatory tests should be carried out on donor's sera for human immunodeficiency virus - HIV, hepatitis B virus- HBV, hepatitis C virus - HCV, venereal diseases research laboratory - VDRL.[1] Approximately, 350 million people worldwide are carrier of chronic HBV.[2]

Transfusion of blood is required in many conditions like surgical and traumatic cases, leukemia, thalassemia, hemophilia, severe anemia, and pregnancy related complications. Severe anemia and complication of

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pregnancy are the most common cause for blood transfusion in developing countries.[3]

Among the population of 5-29 year age road traffic accidents were evaluated as second main cause of injuries, which requires blood transfusion.[4]

"Serological tests are being suggested by the Food and Drug Administration of the United States of America in all donors to reveal the presence of the fatal transfusion transmitted infections (TTIs)- syphilis, HbsAg, anti-human immunodeficiency virus, anti-human T lymphotropic virus-1, and anti-HCV, and anti-hepatitis B core antigen."[5]

"The degree of the transfusion transmitted infections differs in each country on the basis of population rate. It was analyzed that 1–2 per 1000 recipients were at risk of getting infected by viral, bacterial or parasitic agents through contaminated blood. Assumption has been made that among these causative agents mostly the viral agent is the cause for transfusion associated mortality and morbidity."[6]

In 1943 transmission of hepatitis through blood transfusion was first reported by Beeson.[7] Dr.Blumberg identified Australian antigen and in 1967 this antigen was confirmed as a cause of hepatitis B. The discovery of HCV in 1988 by molecular cloning indicated that non - A, non - B hepatitis was primarily by HCV infections.[8]

The degree of the TTI differs in each country on the basis of population rate. The sub - continental areas of India are researched and documented as the endemic zone for intermediate hepatitis B virus out of these HBsAg carriers as 2% - 7%. Globally, India stands as the second largest for prevalence of chronic HBV infection.[9]

Hence, this study was aimed to enhance the awareness about transfusion related risks and to identify the TTIs seroprevalence among healthy blood donors in specific socio-economic group determined under Kuppuswamy's Socio-economic Status Scale (KSESS) which was devised by Kuppuswamy in 1976[10], with a view to implementation of better blood transfusion safety strategies to high risk population.

MATERIAL AND METHODS

A retrospective analysis of total 10,569 blood donors from Jan - 2014 to September - 2015 was conducted at a Blood Bank in a tertiary care hospital in north India. All the donors aged 18-65 years having weight more than 50 kg were selected, after responding to a set of questions for donation. Socioeconomic details of all the donors were recorded and then all donors were categorised according to the most widely used scale, Kuppuswamy's socio-economic status scale — 2013-14, which is a composite score of education and occupation of the head of the family along with monthly income of the family.[10] Venous blood of all selected donors was collected in blood bags and screened according to standard operating procedures of Blood Bank (As per donors selection criteria laid down by Drugs and Cosmetics Act, 1999).[11]

Enzyme linked immunosorbent assay (ELISA) kits from J Mitra & Co Ltd. for HIV-1 p^{24} antigen and anti-HIV I and II (4th generation Microlisa- HIV Ag and Ab), anti-HCV(HCV Microlisa) and HBsAg (Hepalisa) were used for screening. For anti-HCV, third generation Elisa test kits, with increased sensitivity and specificity having a combination of structural and non-structural HCV antigens i.e., Core, E1, E2, NS3, NS4 and NS5 were used. Validation of ELISA was done according to the acceptance criteria laid down by the manufacturer. Ultra rapid test strips from Acon Biotech Co. Ltd were used for syphilis screening and for malaria antigen screening Malaria Ag P.f./Pan SD BIOLINE rapid test kit from SD Bio Standard Diagnostic Private Ltd was used. All the reactive samples were tested again before labelling as sero-positive and then discarded according to the guidelines.

RESULT

Total 10,569 blood donors were grouped as per the KSESS as follows - In Upper Class I - 484, in Upper Middle Class II - 1,552, in Lower Middle Class III - 5,789, in Upper Lower Class IV - 2,261, in Lower Class V - 483

Percentage distribution of donors tested – positive for TTIs in specific KSESS showed that in each class separately the percentage of TTIs positivity was calculated, upper lower class (IV) was found to have maximum TTIs positive blood units (n=248) in comparison to all other classes (lower middle class (III); n=97, lower class (V); n= 34, Upper middle class (II); n=22, Upper class (I); n=01.) (Table 1, Figure 1).

In Percentage wise distribution of transfusion transmitted infection positive donors, among total donations, during study period it was observed that Maximum blood donors belonged to lower middle class (III) – 5,789. Maximum number of donors found positive for transfusion-transmitted infections were in upper lower class (IV) (2.36%) followed by lower middle class (III) (0.92%). The positivity of TTIs infection was found minimum in Upper class (I) (0.009%). (Table 2, Figure 2)

Maximum TTI positivity was found in class IV showing 4.77% cases of HBV, 6.10% cases of HCV and 0.08% cases of HIV out of total 2261 donations of this group. (Table 3, Figure 3)

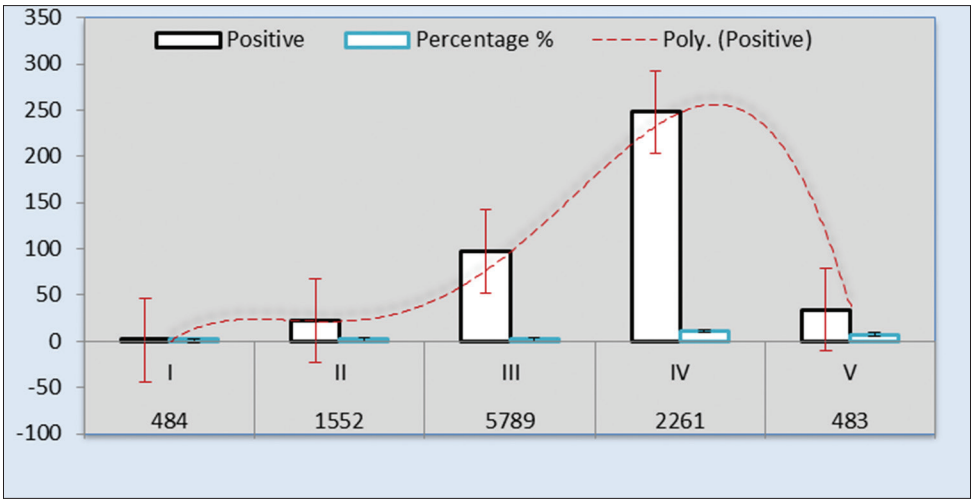

Figure 1: Percentage distribution of transfusion transmitted infections positive donors in specifc Kuppuswamy's socio-economic status scale.

Table 1: Percentage of transfusion transmitted infections positive donors in specific Kuppuswamy's socio-economic status scale

Number of Bleeds	Kuppuswamy's Socio-economic Status Scale (KSESS)	Positive	Percentage
484	I	01	0.20
1552	II	22	1.42
5789	III	97	1.67
2261	IV	248	10.96
483	V	34	7.03

Table 2: Percentage of transfusion transmitted infection positive donors, out of total donations, during study period

Kuppuswamy's Socio-economic Status Scale (KSESS)	Bleeds	Positive	Percentage
I	484	01	0.009
II	1552	22	0.21
III	5789	97	0.92
IV	2261	248	2.35
V	483	34	0.32
Total	10,569	402	3.80

The overall seropositivity of Hepatitis B Virus, Hepatitis C Virus, and Human Immunodeficiency Virus was found as 1.72%, 2.07%, and 0.02% respectively among total donations. The maximum TTIs positivity was found for HCV infection. VDRL and malaria positivity was not found in any class. It was observed that maximum donors found HBV, HCV, and HIV positive were belonging to upper lower classes (IV). (Table 4, Figure 4)

DISCUSSION

Transfusion of blood and blood products are the valuable system of medical field, but concurrently they also bear a peril of transmitting the life menacing TTIs.

Total 10,569 donations were done during study period. Overall Seropositivity for HBV, HCV, HIV, MALARIA and VDRL in the present study was 1.72%, 2.07%, 0.02% respectively and no case was found positive for malaria and VDRL.

Prevalence rate of TTIs has been observed to be reduced in developed countries in past few years. Higher HCV prevalence, in this study was similar to result in Sabharwal R.E et.al[12] and Ibrahim H, et.al[13] study, as 1.37% and 16.8% respectively. The lower prevalence of HBV was in concordance to Sabharwal R.E et.al[12] concluded as 0.20% but which was discordant with Dhruva G.A et.al,[14] Jsani J et.al,[15] Vishwanath Huggi et.al,[16] Shah N et.al,[17] Mandal R et.al[18] and U Geethalakhshmi et.al[19] studies, showing prevalence 0.68%, 1.35%, 2.47%, 0.887%, 1.24% & 1.1% respectively.

Lower prevalence of HIV was in accordance with Mandal R et.al[18] U Geethakhshmi et.al,[19] Dhruva G.A et.al,[14] Sabharwal R.E et.al,[12] Anand V, Bhakta G et.al[20] studies which show prevalence as 0.42% 0.14%, 0.074%, 0.14% & 0.13% respectively and dissimilar to Raghuwanshi B et.al[21] study with higher 0.31% prevalence. The incidence of HIV was detected higher in Manipur, Maharastra, and Tamilnadu.[22]

Prevalence of positive Transfusion transmitted infections in donors of specific Kuppuswamy's socio-economic status scale in present study as-

Upper lower class (2.36%) > Lower middle class (0.92%) >Lower class (0.32%) >upper middle class (0.20) >Upper class (0.009%).

It was in accordance with Malik S, Sharma PR, and et.al[23] study. In their study 7 out of 12 Hepatitis B surface Antigen

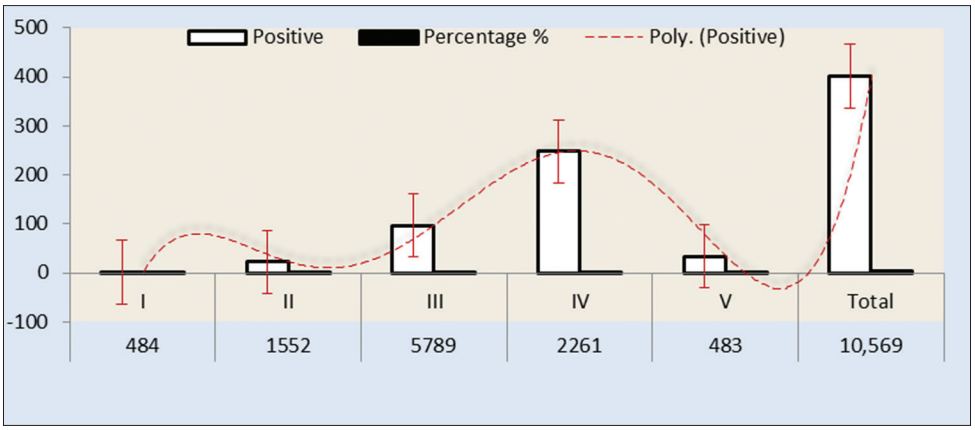

Figure 2: Percentage wise distribution of transfusion transmitted infection positive donors, out of total donations, during study period

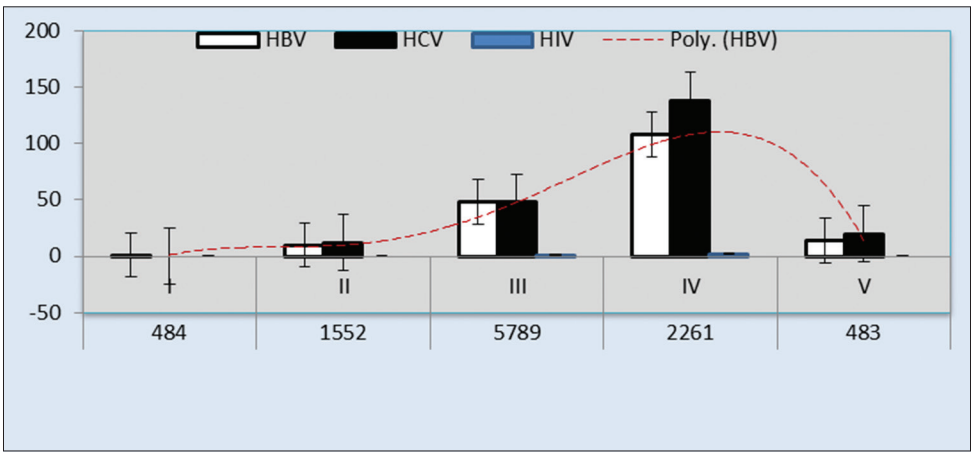

Figure 3: Percentage of specifc transfusion transmitted infections positive donors, in specifc Kuppuswamy's socio-economic status scale

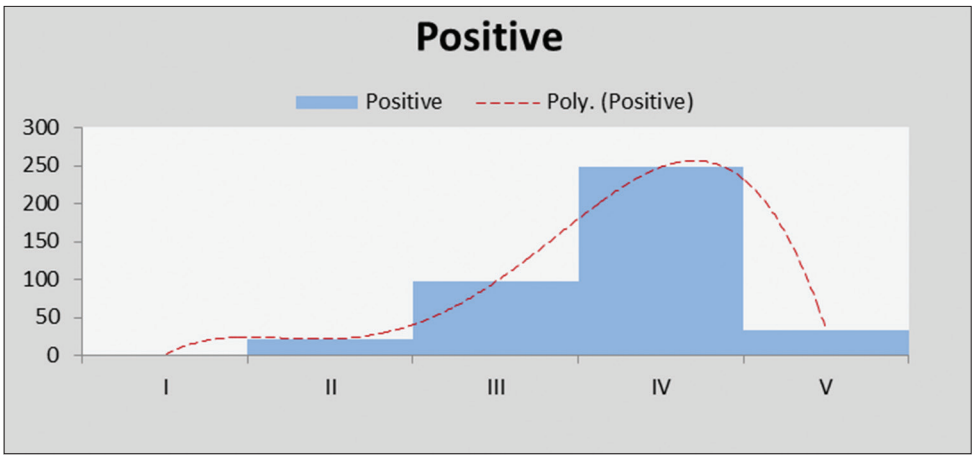

Figure 4: Percentage of specifc transfusion transmitted infections positive donors, out of total donations during study period.

positive donors were of lower socio-economic status and 5 were from middle socio economic status. This difference was statistically significant.

Across the globe, infections caused by hepatitis C virus are a raising public health issue. Hepatitis C viral infections are caused mostly by contaminated blood exposure. It is observed that in many of the HIV infected patient's co-infection of HBV and HCV occur probably due to immunosuppression. Hence, donor selection is of paramount importance.

Seropositivity of VDRL and Malaria was not similar to variable results of other studies.

Table- 3: Percentage of specific transfusion transmitted infections positive donors, in specific Kuppuswamy's socio-economic status scale

Kuppuswamy's Socio-economic Status Scale (KSESS)	Bleeds	HBV	%	HCV	%	HIV	%	VDRL	Malaria
I	484	1	0.20	0	0	0	0	0	0
II	1552	10	0.64	12	0.77	0	0	0	0
III	5789	48	0.82	48	0.82	1	0.01	0	0
IV	2261	108	4.77	138	6.10	2	0.08	0	0
V	483	14	2.89	20	4.14	0	0	0	0

Table- 4: Percentage of specific transfusion transmitted infections positive donors, out of total donations during study period

Kuppuswamy's Socio-economic Status Scale (KSESS)	Positive	HBV	%	HCV	%	HIV	%	VDRL	Malaria
I	01	1	0.009	0	0	0	0	0	0
II	22	10	0.095	12	0.11	0	0	0	0
III	97	48	0.45	48	0.45	1	0.009	0	0
IV	248	108	1.02	138	1.31	2	0.019	0	0
V	34	14	0.13	20	0.19	0	0	0	0
Total	402	181	1.72	218	2.07	3	0.02	0	0

Scant positivity for syphilis has been documented in literature among healthy blood donors. Syphilis being a sexually transmitted disease is the illness of much concern as it shows the existing dangerous activities of people in the society which are peril to the infections like HIV and hepatitis.

"The serological tests are incapable to reveal the diseases in their window period and virus immunological variants are the setback in the helpful preventive approaches. During window period of hepatitis B, detection of the IgM class of antibodies to the hepatitis B core antigen (Anti HBc – IgM) acts as a useful marker which indicates a recent infection. Therefore, IgM is considered to be the good marker used for screening of blood units to ascertain the hepatitis B during the window period."

"To reduce the increased risk of TTIs introduction of nucleic acid amplification testing for HCV, HIV, anti-hepatitis B core antigen (HBcAg) and IgM for hepatitis B infection is recommended to detect the infections during window period.

It is observed that increased number of transfusion transmitted diseases is found in lower socio economic class donors, showing the unawareness of the risk factors among population."

CONCLUSION

In conclusion of our prospective study of 10,569 blood donors we estimated that overall seropositivity of Hepatitis B Virus, Hepatitis C Virus, Human immunodeficiency virus, Malaria and VDRL among all donors was HCV 2.07 % (218) > HBV 1.72% (181) > HIV 0.02% (3), Malaria and VDRL were not found positive in any donor.

So, it is possible to lower down the sero-prevalence of transfusion-transmitted infections by strict execution of selection criteria of donor according to guidelines for blood banks laid in the gazette notification by the Government of India and use of effective and required laboratory screening tests.

Higher sero-prevalence of TTIs in specific socio-economic groups indicates high risk behaviour and negligence. Hence better and more targeted public awareness programmes and institution of adequate public health measures are the need of the day along with the stringent and sensitive screening of all apparently healthy blood donors.

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