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TRANSFUSION TRANSMITTED INFECTIONS AMONG VOLUNTARY BLOOD DONORS OF SOUTH GUJARAT, INDIA: A SECONDARY DATA ANALYSIS

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ABSTRACT

Introduction: It would be useful to analyse the existing data of voluntary blood donors in a way that enables association of some factors with positive screening tests for transfusion Transmitted Infections (TTI) among voluntary blood donors

Objectives: This study conducted to assess positivity for transfusion transmitted infections among voluntary blood donors.

Material & Methods: Case Control study, on voluntary blood donorsof camps during the year 2015with TTIs, while controls are two age matched controls without TTIs.

Observations: The frequency of previous blood donation was statistically significantly different between cases and controls. None of the biological or socio demographic variable could determine the increased risk or protection for TTIs. Different variables showed variable sensitivity, specificity and predictive values for TTIs.

Conclusion: Selected sociodemographic risk factors suggested by many epidemiological studies did not appear significant when tested with screening tests for a few diseases like Hepatitis B, C infection, Syphilis and HIV infections in case of voluntary blood donors.

Keywords: Voluntary blood donors, Transfusion transmitted infections (TTIs), Case control study, Screening test

INTRODUCTION

Globally, more than 81 million units of blood are donated each year[1]More than18 million units of blood are not screened for transfusion transmissible infections [2]. They are therefore unlikely to be totally free of the risk of the infections. Widman FK has claimed that with every unit of blood, there is a 1% chance of transfusion associated problems including transfusion transmitted diseases[3].

Against an annual demand of 12 million units, India is able to collect about 9 million units of which 70% is from voluntary blood donors while the remaining 30% is from family/replacement donors[4].

A voluntary donor is one who donates blood for altruistic reasons. The safest donors are among people who voluntarily donate blood once or twice a year, purely out of altruism and knowing that the absence or minimal risk of health damage to blood recipients. For a safe blood service in our country, where comprehensive laboratory tests are neither possible nor pragmatic, it is best to switch over to 100% voluntary donations, as it is now established that only voluntary non-remunerated regular donation is the safest.[5]

Large number of national and international epidemiological studies and surveys have associated number of sociodemographic factors as risk behav-

iour for specific sexually transmitted diseases and other diseases which are also transfusion transmitted diseases.[6,7,8] Sheetal Godbole et al reported that screening of 2063 individuals in south India revealed prevalence of HIV positivity to the extent of 7.7%.is likely to be due to men moving to urban atras for work leaving their spouse behind in the village and remain away from the family for long time and indulging in high risk behaviour for sexually transmitted infections[9].In a view of voluntary blood donation,it would be useful to analyse the existing data of voluntary blood donors in a way that enables association of some factors with positive screening tests for transfusion Transmitted Infections(TTI)among voluntary blood donors from different camps organized through various voluntary organizations and a SMIMER (Surat Municipal Institute of Medical Education and Research)Blood Bank managed by SMC.

SMIMER receives yearly around 10,000 of blood units mainly through a number of outreach camps organized with various social groups. All blood units are screened by serological tests according to guideline of government of India[10]. As a routine procedure, all donors submit a form for voluntary donation of blood. All the donors pass through a standard procedure for deciding their fitness. Such database can replace time consuming and costly sentinel surveillance with similar accuracy.

OBJECTIVES

1. To study risk of positivity for screening tests applied for voluntary blood donors from all kinds of donation camps using available data.

2. Collection of detailed information of voluntary blood donors and maintenance of a sound database,

MATERIAL & METHODS

Records and registers for voluntary blood donors are being maintained at SMIMER blood bank since long. A data set has been analysed by defining Cases and Controls for the year 2015

All the blood donors coming at the Industry Blood Donation camps during the year 2015, and identified to have one of the following infections on screening after being declared fit on the basis of form(Donor Registration & consent form) were labelled as cases. Infections includedHepatitis B, Hepatitis C, HIV, Syphilisand Malaria

For each case, two age matched controls detected negative for the above mentioned infections were selected. One of the control was from Industry based camps and another was from Community based camps.

Inclusion Criteria for cases and controls are as follows:

All the blood donors coming at the Industry based camps during the year 2015 and found to be positive for any of the infections using ELISA including Hepatitis B, Hepatitis C, HIV, Syphilis or Malaria after being recognized as fit for blood donation were included in the study. All the infection positive blood donors, for whom data for selected variables is available and donors detected negative for above mentioned infections were included in the study.

Exclusion Criteria are as follows:

Those donors coming for Blood donation at the blood donations camps and declared unfit on the basis of the preliminary examination on basis of history of various conditions were excluded. Those donors coming to blood donation camps other than industry and community based camps were excluded from study

OBSERVATIONS

Details of total 35 cases and 70 age matched controls have been analysed. Table 1 indicates that both the cases and controls were comparable in terms of age, body weight and number of years after marriage. All these men donated their blood in six different camp sites in urban and peri urban area of Surat Municipal Corporation. With this comparability, the frequency of previous blood donation was statistically significantly different between cases and controls ($p<0.05$).

When a few socio-demographic and biological factors were tested to calculate the risk of being positive for screened disease conditions, it was observed that none of these characteristic could determine the increased risk or protection as shown in table 2.

Table 1: Summary statistics of selected characteristics of blood donors at SMIMER Blood bank

Characteristics	Case (n=35)		Control (n=70)		P Value
	Median	Mean +SD	Median	Mean +SD	for mean+SD
Age(years)	34	33.6+ 9.5	28.5	32.7+ 8.8	0.632
Weight(Kg)	68	67.6 + 13.5	70	69.7+ 8.8	0.340
Years after marriage	6	8.4+ 8	3	5.1+ 6.4	0.031
Frequency of previous blood donation	0	1.21+ 2.04	1	3.5+ 5.7	0.022

The strength of association between a number of factors like birth during the period of building up of epidemic of HIV/AIDS in India (1985-2000)[11], residing in lower socioeconomical societies, staying away from family, employed somewhere and having unmarried status could not be seen during data analysis.

Biological factors like having blood group O and a Rh negative status independently and personal characteristics like history of previous blood donation could not be stated as risk factors for positive screening test for specific diseases.

In addition, table 3 indicates that when such factors were tested individually for their predictive values, variable results were obtained. Staying alone without family and doing a job instead of self employment had a reasonable sensitivity (>60%), whereas residing in a socioeconomically lower societies and age more than 33 years had a reasonable specificity (>60%)when calculated separately. Negative predictive value was more than 55% for all these factors while positive predictive values were less than 40% for each factor.

Table 2: Association of selected factors with positive screening tests at blood bank, SMIMER

Selected factors	Cases(n=35)	Control(n=70)	OR (95% CI)
Born after 1985	17(48.6)	38(54.8)	0.77 (0.34-1.78)
Job, reported as an occupation	25(70.6)	55(79.0)	0.64 0.24-1.71
Residing in Low socioeconomic area	*8(22.9)*	*12(17.1)*	*1.4 0.52-3.91*
Not reported staying with family	21(60.0)	51(72.5)	0.6(0.2-1.31)
Marital status: Unmarried	7(48.6)	40(57.1)	0.7 (0.3-1.6)
Blood group "O"	12(34.3)	19(27.1)	1.4(0.58-3.35)
Rh Negative donor	3(8.6)	2(2.9)	3.18(0.5-20.0)
No history of ever donated blood before	19(54.3)	33(47.1)	1.33 (0.59-3.0)

Table 3: Assessment of predictive value for selected factors in relation to risk of TTIs

Selected factors	Sensitivity	Specificity	PPV	NPV
Residing in Low socioeconomic area	22.9 (12.1,39.0)	82.9 (72.3,89.9)	40.0 (21.9,61.3)	68.2 (57.7,77.2)
Age greater than 33 years	32.7 (21.8, 45.9)	62.1 (51.6,71.6)	35.3 (23.6, 49.0)	59.3 (49.1, 68.9)
No history of ever donated blood before	54.3 (38.2,69.5)	52.9 (41.3,64.1)	36.5 (24.8,50.0)	69.8 (56.5,80.5)
Marital status: Unmarried	48.5 (32.9,64.4)	42.9 (31.9,54.5)	29.8 (19.5, 42.7)	62.5 (48.4,74.5)
Not reported staying with family	60.0 (43.6,74.5)	27.5 (18.5,39.1)	29.6 (20.2, 41.3)	57.6 (40.8,72.8)
Job, reported as an occupation	70.5 (53.8,83.1)	20.9 (12.7,32.6)	32.8 (23.2, 44.3)	56.5 (36.8,74.3)

PPV=Positive predictive value; NPV=Negative predictive

DISCUSSION

A number of epidemiological studies and reports have associated a few characteristics like social class, marital status, not staying with families, doing some job as an employee and past history of blood donation with some kind of added risk for a specific group of diseases identified as Transfusion Transmitted Infections(TTIs) and Sexually Transmitted Infections(STIs)[12,13,14]. This study found that no such association could be seen between factors like residing in lower socioeconomic residential societies, being unmarried, not staying with family, doing a job instead of self employment, age more than 33 years and belonging to a birth cohort of rising cases of HIV/AIDS and seropositivity for conditions like HepatitisB,C and HIV infection in case of voluntary blood donors. All subjects in this study were male and it is known that STDs and HIV usually get transmitted from a male to females. The findings of this analysis rules out such associations at least from voluntary blood donors. Here we assume that a men, aware of his risk behaviour and knowing his HIV status carries 50-50 percent chances that he may come forward to donate his blood and in this way confirm his status. This assumption also support that, the selectedconventional epidemiological risk factors did not appear in case of voluntary blood donors. This study did not see that the cliantage (donors) from epidemiologically high risk area for TTD had in fact increase the yield of screening tests even when the study subjects were all men predominantly from industrial background(suggested by lower positive predictive values for selected factors, less than 40%).

If we combine two or more characteristics, it is likely that the confidence interval widens for risk as well as predictive values calculated so far.

The proportion of positively screened blood unit in SMIMER blood bank was 1.13%. Further lower levels(0.08%-0.3%) of TTI have reported by Piyush Patel et al from Blood bank of Sola Medical College of Ahmedabad[14]Piyush et al also reported in his paper a table which displays seroprevalences

of specific diseases from Ludhiana, Lucknow, Bhanpur, Pipariya, Etawa and Ahmedabad for which sentinel surveillance , a time and cost intensive special form of surveillance used to be conducted regularly by NACO(National AIDS Control Organization). Adding a few questions in blood donors questionnaire would be able to generate trend automatically from existing data rather than separate conduction of sentinel surveillance for STIs and TTIs. Monitoring of trend by pooling the data from all the blood bank can replace the whole of sentinel surveillance rounds for even general population[15]

CONCLUSIONS

Selected Socio demographic risk factors suggested by many epidemiological studies did not appear significant when tested with screening tests for a few diseases like Hepatitis B, C infection, Syphilis and HIV infections in case of voluntary blood donors.

Men from industrial areas in and around urban localities and from lower socioeconomic societies who possess the risk factors like being unmarried, staying alone, employed as an employee, gone through the HIV epidemic during reproductive years and may be positive for hepatitis or HIV do not usually come forward to donate their blood due to their awareness in this context or may not be fit or willing to donate their blood. This observations suggests less possibilities of transfusion transmitted diseases even when the blood donation camp collected the blood from epidemiologically high risk area. It may also reflect the reduction of incidence of hepatitis B, C and HIV and STIs not only in general population but also in people having risk factors mentioned earlier.

Blood donation from potential voluntary donors shall be encouraged from all stratae of society without giving undue emphasis on so called epidemiological risk factors discussed earlier would go a long way in fulfilling the ever increasing gap between demand and supply of human blood.

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