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RESEARCH ARTICLE

"BLOOD": PREVALENCE OF BLOOD BORNE INFECTIOUS DISEASES IN A LARGE POPULATION OBSERVED OVER BLOOD DONORS

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ABSTRACT

Aim: To determine the prevalence of Rh positivity, distribution of blood groups, Blood Borne Infectious Diseases (BBID), age and weight related to blood donors, test validation and post donation counseling among the South Indian blood donors.

Materials and Methods: Blood screening for blood borne infectious diseases were done for, 1, 70,001 blood donors with in Rajiv Gandhi Government General Public Hospital. Age, weight, test validation, look back process done and recorded.

Results: Among the 1, 70,001 blood donors, (Rh positive: 96.3%, Rh negative: 3.7%). Blood groups, were (A-17.9%, B-34.2%, O-42.1% and AB-5.7%). 1775 donors (1.04%) were reactive for HIV, HBsAg and HCV. Of, 1775 donors 51 donors were reactive for HIV (2.8%), 1657 were reactive for HBsAg (93.4%) and 67 were reactive for HCV (3.8%). Increased age and less weight in HIV reactive donors, increased age and body weight in HCV donors and decreased age and increased body weight in HBsAg donors were found. Enzyme-Linked Immune-Sorbent Assay (ELISA) was sensitive 71.3% and rapid test was sensitive in 28.7%. In regional distribution, we found 1435 (80.8%) reactive blood donors donated blood in Chennai and 340 (19.2%) were found Other Than Chennai (OTC).

Conclusion: In conclusion our study reflected higher number of Rh+ blood donors, higher distribution of blood group were "O" followed by "B". HBsAg was higher among blood donors. Older age and lesser weight in HIV reactive donors, young with increased body weight in HBsAg and older and higher body weight in HCV reactive donors. ELISA was best in test validation.

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INTRODUCTION

Blood Borne Infectious Diseases (BBID) is any infection that is potential for transmissible from individual to individual through parental administration of blood or blood products. The level of BBID's varies from country to country depending on BBID's prevalence in that particular population. Human blood is an essential element which can't be substituted. Blood transfusion saves millions of live worldwide every day. As the rate of Blood Borne Infectious Diseases increases among the blood donors the eligibility of blood donation falls. Reactions happen as soon as the transfusion is started when mis-matched blood is transfused but HIV, HBsAG and HCV takes several days or months to develop. With over 93 million donations made every year worldwide, blood transfusion continues to save millions of lives each year and improve the life expectancy and quality of life of patients suffering from life-threatening conditions (Global blood safety and availability, 2010). Morbidity and mortality resulting from the transfusion of infected blood have far-reaching consequences, not only for the recipients themselves, but also for their families, their communities and the wider society (World Health Organization, 2007). An economic cost of transfusion transmissible infection is high including medical care, dependency and the loss of productive person which in turn is a national economy burden. According to WHO, safe blood is a universal right (National AIDS control program). Among the transfusion transmissible infection, HIV has infected more than 33 million people worldwide and infection rates continue to increase (Branch, 2010). According to WHO fact sheet 2 billion people infected with HBV (World Health Organization, 2012) and 150 million people are chronically infected with HCV (World Health Organization, 2012). The estimated HIV prevalence in adults was 0.31% in 2009 and as per the National AIDS Control Organization (NACO), 2.5% of HIV infection is attributed to blood transfusion (National AIDS Control Organization, 1996). Among the prevalence of hepatitis, HBV were 9.6 % to 12.0 % in urban areas, and 21 % in rural

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communities (Ghana Immunization Programme, 2010). India is the second most populous nation in the world. The Indian subcontinent is classified as an intermediate HBV endemic (HBsAg carriage 2-7%) zone and has the second largest global pool of chronic HBV infections (Lavanchy, 2004). The relationship between the status of hepatitis B immunity and metabolic syndrome remains unclear although chronic hepatitis B infection has been reported to associate with metabolic syndrome (Jan *et al.,* 2006). Characterization of viral persistence and liver disease burden is important because co-factors which may impact HCV pathogenesis are different in India (*e.g*., heavy alcohol use, high prevalence of infections such as tuberculosis, HIV sub type C and poor nutritional status) (Shruti, 2010). "In any country, as the proportion of the population with infectious diseases, such as HIV and hepatitis increase the proportion of the population who are eligible to donate blood falls (Richards *et al.,* 1991). Hence transmission of HIV, HBV, and HCV is a major problem in developing countries where blood safety standards are not very high (Ricerca *et al.,* 2009). Regardless of testing modality chosen, a non zero risk of disease transmission still exists in all its seriousness (Kucirka *et al.,* 2011). The challenge of unsafe blood transfusion continue to perpetuate in most developing countries partly due to logistics constrains and insufficient resource persons in the field of transfusion medicine (Osaro and Charles, 2011). With these alarming fact sheets our current study was focused on prevalence of Rh positivity, distribution of blood groups, and prevalence of blood borne infectious diseases among the blood donors in south India. We also tried to provide data base for significance of age and weight of blood donors, test validation and post donation counseling of donors among the South Indians.

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MATERIALS AND METHODS

A total of 1, 70,001 blood donors were screened and donated blood in Rajiv Gandhi Government General public Hospital. Donors were from various parts of Tamil Nadu. Parameters like age, weight and blood screening for various Blood Borne Infectious Viruses (BBIV) like HIV, HBsAg and HCV were performed. Both rapid detection test (RDT) and ELISA were preformed. Pre donation and post donation counseling were provided to donors and informed consent form was obtained. Standard data collection sheets were used to collect clinical, socio-demographic, anthropometric, and biological data.

Ethical clearance

Study was conducted in accordance with ethics research committee and ethical clearance was obtained from ethics research committee of institution. Pre-donation counseling which include an assessment of risk factors and an opportunity for self-exclusion or confidential unit exclusion (Saran, 2003) were obtained. Patient's consent forms were received from all the patients for conducting this present study (Patel *et al.,* 2012).

Donor selection

Inclusion criteria for donors: Age group (yrs) ≥18 to ≤55. **Exclusion criteria for donors:** Age group (yrs) ≥17 years or ≤56 years, body weight<50 kg.

Sample collection

Blood samples were collected from donors by aseptic vein puncture and blood grouping were done and clotted blood samples were spun in a centrifuge at 2500 rpm for 5 minutes to separate the serum which was used for the analysis for HIV, HBsAg and HCV.

Serological analysis

The serological screening tes was done by both Rapid Detection Test (RDT) and ELISA method. HBsAg was tested by 3rd generation (ELISA), HIV 1 & 2 were tested by 3rd and 4th generation ELISA and HCV was tested by 3rd generation ELISA methods. Samples found reactive were retested for confirmation.

Statistical analysis

Data are expressed as percentages, means, standard deviations and SEM were performed. Student's't' test and chi-square test were done wherever required. One way ANOVA was performed to find statistical significantance between age and weight of the blood donors. P-values <0.*05* were considered significant. Analysis was performed using statistical package SPSS version 10.0 (SPSS, USA).

RESULTS

Out of 1, 70,001 donors, 1775 donors were reactive for any one of the blood borne infectious viruses like HIV, HBsAg and HCV. Overall seroprevalence of blood borne infectious virus among the blood donors was 1.04%. Among the reactive blood donors, O blood group were in higher prevalence followed by B blood group with the percentage of 42.1% and 34.2% respectively and the prevalence were statistically significant (Table-1). Table-2 shows the overall Sero-prevalence of blood borne infectious virus (BBIV) among the blood donors. In the distribution of blood borne infectious diseases, 51 donors were reactive for HIV (2.9%), 1657 donors were reactive for HBsAg (93.3%) and 67 donors were reactive for HCV (3.8%) which was statistically significant. Apart from the prevalence of blood borne infectious diseases we tried to compare the age and body weight of reactive blood donors as several studies conducted were only shown the age variation. The body weight of the study subjects were compared with the assessment chart of the heart foundation. According to assessment chart an individual is overweight with 70 kg and 5.7" to 5.11" (without shoes). Age and weight was compared with the assessment chart and recorded and studied the significance of age and weight of donors. Table-3, shows the comparison of age and weight of the donors and the findings were increased age and lesser weight in HIV reactive donors and increased age and increased body weight in HCV reactive donors and decreased age and increased body weight in HBsAg reactive donors. We have done one way ANOVA statistics test to find out the significance between age and weight of the blood donors. Table-4, shows the comparison of our methodology by evaluating the tests by test validation for detection of blood borne infectious diseases which is Rapid Detection Test (RDT) and ELISA method. This analysis helped us to understand which method of screening we have to use for our blood donors.

Table1. Based on blood groups the Sero-prevalence of blood borne infectious diseases of blood donors

Reactive Blood Group (n=1775) (1.04%)	HIV (n=51)		HBsAg (n=1657)		HCV (n=67)		Chi-square, P value
	Nos	%	Nos	%	Nos	%	
A+ & A- (n=318) 17.9%	12	23.5	293	17.7	13	19.4	742.274,<0.0001*
B+ & B-(n=607) 34.2%	16	31.4	569	34.3	22	32.8	1495.191,<0.0001*
O+ & O-(n=748) 42.1%	20	39.2	701	42.3	27	40.3	1841.081,<0.0001*
AB+ & AB-(n=102) 5.7%	3	5.9	94	5.7	5	7.5	238.324,<0.0001*

* Statistically Highly Significant (P value <0.05 is considered statistically significant)

Table 2. Distribution Blood Borne Infectious among blood donors

Blood Borne Infectious Diseases	Number of reactive Donors (n=1775)	Percentage of reactive Donors	Chi-square, P value
HIV	51	2.9 %	4316.275, <0.0001*
HBsAg	1657	93.3%	
HCV	67	3.8%	

* Statistically Highly Significant (P value <0.05 is considered statistically significant)

Table 3. Comparison of Age, Weight of blood donors reactive with Blood Borne Infectious virus

Blood Borne Infectious virus (n=1775)	Mean Age (yrs)	Age Std Dev (yrs)	Average Weight (kgs)	Weight Std Dev (kgs)	SEM	P value
HIV (n=51)	29.7	8.2	68.6	5.5	1.148, 0.7702	<0.0001*
HBsAg (n=1657)	28.6	7.7	70.3	6.2	0.1892, 0.1523	<0.0001*
HCV (n=67)	30.6	10.1	71.8	4.2	1.234, 0.5131	<0.0001*

* Statistically Highly Significant (one way ANOVA) (P value <0.05 is considered statistically significant)

Table 4. Comparison of screening methods for HIV, HBsAg and HCV

S.no	Blood Borne Infectious Virus	ELISA n=1265 (71.3%)		Rapid Detection Test (RDT) n=510 (28.7%)		Chi-square, P value
	n=1775	Nos	%	Nos	%	
1	HIV (n=51)	38	74.5	13	25.5	22.588, <0.0001*
2	HBsAg (n=1657)	1177	71.0	480	29.0	584.690, <0.0001*
3	HCV (n=67)	50	74.6	17	25.4	30.567, <0.0001*

* Statistically Highly Significant (P value <0.05 is considered statistically significant)

Table 5. Regional distribution of reactive blood donors

Blood Borne Infectious Diseases (n=1775)		Regional distribution of reactive blood donors (n=1775)				Chi-square, P value
		Chennai (n=1461)	82.3 %	Other Than Chennai (n=314)	17.7 %	1479.793, <0.0001*
HIV	(n=51)	41	80.4%	10	19.6%	35.294, <0.0001*
HBsAg	(n=1657)	1261	76.1%	396	23.9%	901.021, <0.0001*
HCV	(n=67)	52	77.6%	15	22.4%	38.687, <0.0001*

* Statistically Highly Significant (P value <0.05 is considered statistically significant)

Table 6. Lookback process of blood borne infectious reactive donors

Total no of reactive Donors	No of Donors in contact	No of Donors Responded	No of Donors sent for further process	Chi-square, P value
(n=1775)	(n=1017)	(n=555)	(n=259)	728.830, <0.0001*
HIV (n=51)	37	21	17	17.575, <0.0001*
HBsAg (n=1657)	941	509	223	706.289, <0.0001*
HCV (n=67)	39	25	19	12.970, <0.002*

* Statistically Significant (P value <0.05 is considered statistically significant)

ELISA was able to detect 71.3% of blood borne infectious diseases of blood donors and RDT was able to detect only 28.7%. Detection rate is double time higher in ELISA than RDT. Statistical significantance was observed while performing Chi-square and P value. Table-5, shows the regional distribution of donors who donated blood in south Indian region and were reactive for blood borne infectious diseases and the findings were 1461 reactive donors were found in Chennai (82.3%) and 314 were found Other Than Chennai (OTC) (17.7%). Table-6, shows the post donation counseling of the donors. 51 HIV reactive donors have been contacted and 37 attended our call and 21 donors visited our blood bank and they were given counseling and directed to referral center for HIV follow-up. Out of 1657, HBsAg reactive donors, 941 donors have been contacted and 509 donors visited our blood bank and they have been directed to hepatology department for further follow up.

Out of 509 donors, 223 donor's few family members have been contacted and they have been issued HBV vaccination schedule chart and asked to report to our vaccination nurse for any unusual reaction after a hepatitis B vaccination. Out of 67, HCV reactive donors, 39 donors picked up our call and only 25 donors visited our blood bank and they were directed to hepatology department for further process and to carry out HCV RNA test.

DISCUSSION

In our study among the reactive blood donors O blood group were in higher prevalence with 40.2% followed by B blood group. Our study found compatible with study by Patel Piyush *et al.,* 2012; Ahmad *et al* 2004 found in his study that B antigen links with increased risk of ovarian cancer and diabetes mellitus (Ahmad *et al* 2004).

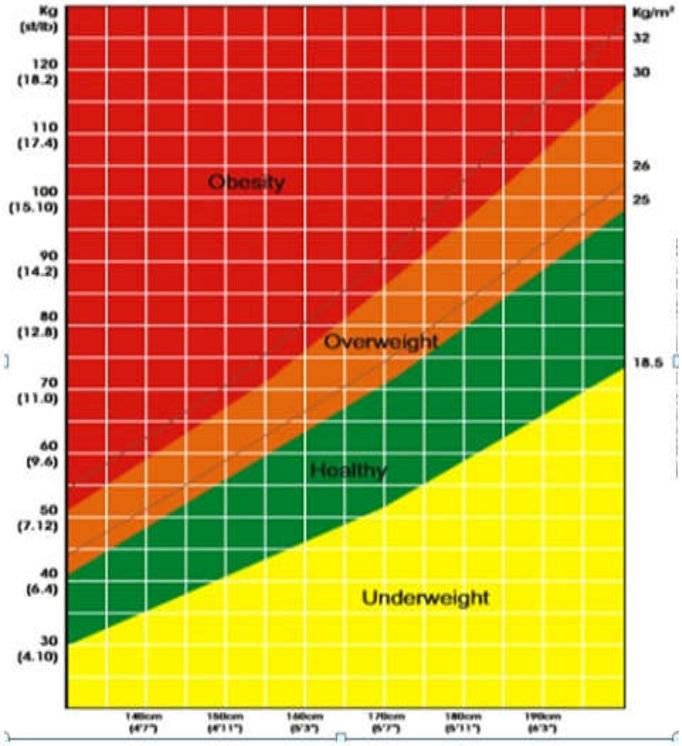

Figure 1. Over weight assessment chart

Our results showed HBsAg were found in higher percentage in all the blood groups. The Indian National AIDS Control Organization (NACO) suggested an overall prevalence of 0.91% for HIV (2005) in India. One way of preventing the spread of these blood-related viral infectious agents is via safe blood transfusion (Osaro and Charles, 2011). Even though the blood donors were appeared healthy, higher prevalence of HBsAg in our study shows that some donors in future may go on to develop chronic hepatitis, cirrhosis, and some may even develop hepatocellular carcinoma. As the percentages of HBsAg reactive donors were higher and they require early treatment, early preventable measures and early counseling to family members to bring down the higher prevalence of HBsAg among the blood donors. In a study by Jad Saab *et al* (evaluating the cause of death in obese individuals) found that (8- liver disease 7- cirrhosis, 3-alcohol, 4 –HCV and 1-autoimmune hepatitis) (Jad Saab and Steven, 2015). Ana Cláudia de Oliveira *et al* stated that no consistent data are available on the association between age range at diagnosis and disease progression (Ana Cláudia de Oliveira- *et al.,* 2014). Our present conducted study tried to find out the outcome for the above statement and statistically significant correlation was found between the age and the weight of the reactive donors. In our present study conducted we found statically significant correlation of age and weight of blood donors. The observable findings of our present study were increased age and lesser weight in HIV reactive donors and increased age and increased body weight in HCV reactive donors. In our study group donors with HBsAg and HCV were overweight than HIV reactive donors. In test validation in our present study ELISA was sensitive than Rapid tests. Apart from test validation we have studied area wise distribution of reactive donors in Tamil Nadu. In area wise distribution we found higher number of reactive donors were found in Chennai than in other areas around Chennai this may be due to the blood donation camps were higher in Chennai than other areas of Chennai. Similar findings were observed by Pitchai *et al.,* 2015 Lookback refers to the process of identifying, tracing, recalling, counseling and testing patients (NHMRC, 2010). In our present study in the post donation counseling session less number of donors responded still lookback process will be beneficial as notification of reactivity helps the blood donor first, secondly his or her family and then to the society. Knowing and understanding confirmed infection rates in blood donors helps to ensure that donor selection, donor deferral and blood screening strategies are up-to-date and effective. Post-donation counseling may reveal the probable exposure histories of infected donors and can help identify populations at risk of infection. This kind of information aids in possible routes of infection and the effectiveness of the donor education and donor selection. The donor assessment not only enables the review of the donor's medical history and medications, but also provides an opportunity for a basic health check to assess whether the donor is in general good health. In conclusion in our present study found higher prevalent of blood group were "O" higher number of reactive donors were with Hepatitis B virus and HIV reactive donors were with decreased weight and older age. Younger age and increased weight were seen in HBsAg reactive donors and HCV reactive donors were with increased weight and age. ELISA was sensitive than one step rapid method and reactive donors responded less to post donation counseling. Hence by early regular screening we can reduce the wastage of resources like donor and staff time, consumables, screening tests, and also avoid needle discomfort to donors during blood donation.

REFERENCES

Ahmad, J., Taj, A.S., Rahim, A. Frequency of Hepatitis B and Hepatitis C in healthy blood donors of NWFP: a single center experience. *J Postgrad Med Inst*., 2004; 18:3:343-52.

Ana Cláudia de Oliveira , Ana Clara Bortotti, Nathália Neves Nunes , Ibrahin A.H. El Bacha, Edison Roberto Parise; Association between age at diagnosis and degree of liver injury in hepatitis C; *Braz J Infect Dis*., vol.18 no.5 Salvador Sept./Oct. 2014, http://dx.doi.org/10.1016/j.bjid.2014.04.003

Branch DR..Blood groups and susceptibility to virus infection: new developments. Curr Opin Hematol 2010:7, 558-64.

Ghana Immunization Programme: Comprehensive Multiyear Plan (2010-2014) in line with Global Immunization Vision and Strategies 2010: 10-45.

Global blood safety and availability. Key facts and figures 2010.

HIV/AIDS Epidemiological Surveillance & Estimation Report for the year 2005. National AIDS Control Organization, Ministry of Health and Family Walefare, Government of India 2006. Available from: URL: http://www.nacoonline.org/fnlapi06rpt. Pdf.

Jad Saab, Steven P. Salvatore. Evaluating the Cause of Death in Obese Individuals: A Ten-Year Medical Autopsy Study: *Journal of Obesity*, (2015) Article ID 695374, 7.

Jan, C.F., Chen, C.J., Chiu, Y.H. A population-based study investigating the association between metabolic syndrome and hepatitis B/C infection (Keelung Community-based Integrated Screening study no. 10). *Int J Obes Relat Metab Disord*., 2006; 30: 794-99.

Kucirka, L. M., H. Sarathy, P. Govindan. "Risk of window period HIV infection in high infectious risk donors: systematic review and meta-analysis," *The American Journal of Transplantation*, 2011; 11 (6):1176-87. View at Publisher · View at Google Scholar · View at Scopus.

Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures: *A review. J Viral Hepat.,* 2004 11: 97-107.

National AIDS Control Organization. National AIDS Control Programme, India: country scenario, an update. National AIDS Control Organization, Ministry of Health & Family Welfare, Govt. of India, 1996. Available from: http://www.naco.gov.in/NACO/about NACO, 2015.

National AIDS control program. Ministry of national health services, Regulation and coordination. Government of Pakistan. Available from: URL: http://www.nacp.gov.pk/

NHMRC, 2010. Australian Guidelines for the Prevention and Control of Infection in Healthcare. Commonwealth of Australia.

Osaro, E., Charles, A.T. The challenges of meeting the blood transfusion requirements in Sub-Saharan Africa: the need for the development of alternatives to allogenic blood. *Journal of Blood Medicine*, 2011; 2(1):7-21.

Osaro, E., Charles, A.T. The challenges of meeting the blood transfusion requirements in Sub-Saharan Africa: the need for the development of alternatives to allogenic blood; *Journal of Blood Medicine*, 2011; 2 (1) :7-21

Patel Piyush, A., Patel, S., Shah, J. Frequency and distribution of blood groups in donors in western Ahmadabad. *National Journal of Medical Research,* 2012; 2:2: 202-06.

Patel, D. P., D. S. Patel, D. J. Bhatt, D. N. Bhatnagar, D. M. G. Shah, "Evaluation of response to donor notification of reactive transfusion transmitted infections (ttis) result," *National Journal of Integrated Research in Medicine,* 2012; 3(2): 20-25,. View at Google Scholar

Pitchai, R. *et al*. 2015. Seroprevalence of hepatitis B virus, hepatitis C virus, HIV, and syphilis among blood donors at a tertiary care teaching hospital in Salem, Tamil Nadu; *National Journal of Basic Medical Sciences*, 5:3.

Ricerca, B. M., A. D. Girolamo, D. Rund. "Infections in thalassemia and Hemoglobiopathies: focus on therapy-related complications," *Mediterranean Journal of Hematology and Infectious Diseases,* 2009; 1(1), Article ID e2009028, 2009. View at Publisher · View at Google Scholar

Richards, C., Holland, P., Kuramoto, K. Prevalence of antibody to hepatitis C virus in a blood donor population. Transfusion, 1991; 31(11):109-13.

Saran, R.K. Transfusion medicine, Technical Manual. 2nd ed. New Delhi, India: Directorate General of Health Services (DGHS), Ministry of Health and Family Welfare, Government of India; 2003.

Shruti H. Mehta. Epidemiology of hepatitis C virus infection & liver disease among injection drug users (IDUs) in Chennai, India; *Indian J Med Res*., 2010; 132(6): 706-14.

World Health Organization (WHO) Status of blood safety in the WHO African Region: Report of the 2004 Survey WHO Regional Office for Africa, Brazzaville 2007: 25:1-25.

World Health Organization. Hepatitis B fact sheet number 204, 2012.

World Health Organization. Hepatitis C Fact sheet number 164, 2012.

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