Research Paper

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Seroprevalence and Trends of Transfusion Transmissible Infections in Blood Donors At Zonal Blood Transfusion Centre, Jodhpur, Rajasthan, India.

Medical Science

KEYWORDS : Infectious disease, Blood donor, Transfusion, Prevalence.

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ABSTRACT

Background - Blood is a life saving drug. Transfusion of blood carries risk of transfusion transmitted diseases. Therefore predonation counselling of donors and screening of each unit of blood is mandatory. Aims - Study is done with aim to analyze the seroprevalance of five important infectious diseases on a total of 42121 blood donors over 4 year study period at blood transfusion centre located at Jodhpur, Rajasthan, India. Material and Methods - Each blood donor is screened for anti-human immunodeficiency virus (HIV), hepatitis B surface antigen (HBsAg), anti-hepatitis C virus (HCV), rapid plasma reagin (RPR) slide kit test for syphilis and card test for malarial parasites. Screening for anti-HIV, HBsAg and anti-HCV was carried out by enzyme linked immunosorbent assay (ELISA).Syphilis was tested using RPR slide kit test. Malarial parasite was tested by antigen rapid card test. Statistical Analysis - Graph pad prism software (Chi square test). Result - Study shows the overall seropositivity of 2.69%(1135/42121), while individual seropositivity for anti-HIV was 0.28%(122/42121), for HBsAg 2.03%(857/42121), for anti-HCV 0.21%(91/42121), for syphilis 0.12%(51/42121) and for malaria 0.033%(14/42121). There was no statistically significant difference ($p>0.05$) in the seropositivity of various markers between voluntary and replacement donors except for HBsAg($p<0.05$). There was statistically significant difference ($p<0.05$) in the prevalence of seropositivity for HIV, HCV, HBsAg, syphilis and malaria over a period of four years study. Conclusion - Study concludes that the continuous and consistent predonation counseling and blood screening and Hepatitis B vaccination in community should be mandatory.

INTRODUCTION:-

Transfusion-transmissible infectious agents such as hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C virus (HCV), syphilis and malaria are among the greatest threats to blood safety for transfusion recipients and pose a serious public health problem. Blood transfusion can be a source for transmitting life threatening infections if screening is not carried out properly[1].

The prevalence of anti-human immunodeficiency virus (HIV), hepatitis B surface antigen (HBsAg), anti- hepatitis C virus (HCV) and syphilis positivity in Indian blood donors is 0.084-3.87% [2-8], 0.66-12% [2-7], 0.5-1.5% [4-7,9-11] and 0.85-3% [5-7] respectively.

The present study was done to estimate the prevalence of infectious disease markers in the blood donor population of western Rajasthan , India.

MATERIAL AND METHODS:-

A total of 42121 units of blood was collected from voluntary and replacement donors over a period of four years from January 2009 to December 2012 at Blood Bank Umaid Hospital, western Rajasthan. Voluntary donors had donated blood either in the blood bank or in camps organized by mobile teams. Replacement donors donated blood for their patients. Counseling of donors was done pre-collection and post-collection of blood.

Samples were screened by enzyme linked immunosorbant assay (ELISA) kits (Bio Standard Diagnostics Pvt. Ltd.) for anti-HIV, HBsAg and anti-HCV. Validity of ELISA tests was assessed by means of acceptance criteria laid down by the manufacturer for the absorbance of reagent blank as well as mean absorbance of positive and negative controls present with the test kits. Known positive and negative controls were randomly used as external controls. Known positive and negative samples were also sent for external quality control at an interval of 3 months.

Screening for syphilis was carried out using rapid plasma reagin (RPR) slide kit test (AGAPPE Diagnostics Ltd.).

Malaria screening was done by Satya Malaria Antigen PF/PAN rapid test kit (mfg. by Viola Diagnostic System).

Seropositive blood units were discarded.

SELECTION AND DESCRIPTION OF PARTICIPANTS:

All blood donors registered at our zonal blood transfusion center and also those registered at blood donation camps conducted by our blood bank were included in our study.

TECHNICAL INFORMATION:

Samples were screened by enzyme linked immunosorbant assay (ELISA) kits (Bio Standard Diagnostics Pvt. Ltd.) for anti-HIV, HBsAg and anti-HCV. Screening for syphilis was carried out using rapid plasma reagin (RPR) slide kit test. Malaria screening was done by rapid test kit.

STATISTICS:

Graph pad prism software (Chi square test) used for statistical analysis.

RESULT:

A total of 42121 units of blood were screened over a period of four years, of which 42.95% (18094/42121) were replacement and 57.04% (24027/42121) voluntary donors. The overall seropositivity of infectious diseases was 2.69% (1135/42121). The overall seropositivity in replacement do-

nors was 2.9% (525/18094) and in voluntary donors was 2.53% (610/24027). There was statistically significant difference in the overall seroprevalence in voluntary and replacement donors Table 1.

Percentage of HIV seropositivity was 0.15% (17/11183) in 2009, 0.39% (46/11581) in 2010, 0.29% (30/10343) in 2011 and 0.32% (29/9014) in 2012, with an overall seropositivity of 0.28% (122/42121). The prevalence of seropositivity of HIV in voluntary donors was 0.26% (64/24027) and replacement donors was 0.32% (58/18094). There was no statistically significant difference in the prevalence of HIV positivity in voluntary and replacement donors [Table 2]. There was statistically significant difference in the prevalence of HIV over a period of four years study [Table 3].

HCV seropositivity fell from 0.026% (3/11183) in 2009, 0.27% (32/11581) in 2010, 0.15% (16/10343) in 2011 and 0.44% (40/9014) in 2012 with an overall positivity of 0.21% (91/42121). Prevalence of anti-HCV positivity in voluntary donors was 0.23% (56/24027) and replacement donors 0.19% (35/18094). There was no statistically significant difference in the prevalence of HCV positivity in voluntary and replacement donors [Table 4]. There was statistically high significant difference in the prevalence of HCV over a period of four years study [Table 5].

HBsAg seropositivity ranged from 1.77% (199/11181) in 2009, 1.93% (224/11581) in 2010, 2.17% (225/10343) in 2011 and 2.31% (209/9014) in 2012, the overall figure being 2.03% (857/42121). Seropositivity for HBsAg showed a upward trend from 2009 to 2012. Prevalence of HBsAg positivity in voluntary donors was 1.87% (451/24027) and replacement donors 2.24% (406/18094). There was statistically significant difference in the prevalence of HBsAg positivity in voluntary and replacement donors [Table 6]. The increasing in the positivity for HBsAg over a period of four years study was statistically significant ($p<0.03$) [Table 7].

Seropositivity for syphilis showed 0.10% (12/11581) in 2010, 0.21% (22/10343) in 2011 and 0.188% (17/9014) in 2012, the overall figure being 0.12% (51/42121). Prevalence of syphilis positivity in voluntary donors was 0.12% (28/24027) and replacement donors 0.13% (23/18094). There was no statistically significant difference in the prevalence of syphilis positivity in voluntary and replacement donors [Table 8]. There was statistically high significant difference in the prevalence of syphilis over a period of four years study [Table 9].

Seropositivity for Malaria showed 0.106% (11/10343) in 2011 and 0.033% (3/9014) in 2012, the overall figure being 0.033% 14/42121. Prevalence of Malaria positivity in voluntary donors was 0.045% (11/24027) and replacement donors 0.016% (3/18094). There was no statistically significant difference in the prevalence of Malaria positivity in voluntary and replacement donors [Table 10]. There was a statistically significant difference in the prevalence of Malaria positivity over a period of four years study [Table 11].

DISCUSSION:-

The overall seropositivity of infectious diseases was 2.69% (1135/42121). The overall seropositivity in replacement donors was 2.9% (525/18094) while in voluntary donors it was found to be 2.53% (610/24027) and this difference was found to be statistically significant.

The prevalence of HIV seropositivity (0.28%) was similar to that reported by other studies [2, 6-8], except for a seropositivity rate of 0.084% reported by Gupta N et al [5], 0.13% reported by Lt Col A Chattoraj et al [3] and 0.1% reported by S. Awasthi et al [4]. There was no statistically significant difference in the prevalence between voluntary and replacement donors, unlike other studies [5-7], which showed a lower prevalence of HIV positivity in voluntary donors. There was statistically significant difference in prevalence of HIV seropositivity over a period of four years study.

The prevalence of Anti-HCV positivity (0.21%) was lower than that reported by other studies [4-7, 9-11] except 0.19% reported by Lt Col A Chattoraj et al [3]. There was no statistically significant difference in the prevalence between voluntary and replacement donors, unlike other studies [5-7, 9-11], where anti-HCV positivity was higher in replacement donors as compared to voluntary donors. Anti-HCV positivity showed a statistically significant difference during the study period.

The prevalence of HBsAg seropositivity (2.03%) was similar to that reported by other studies [4-7]. There was statistically significant difference in the prevalence between voluntary (1.87%) and replacement (2.24%) donors similar to other studies [5-7], which showed a higher seropositivity in replacement as compared to voluntary donors. HbsAg positivity showed a significant upward trend during the study period.

The prevalence of Syphilis seropositivity (0.12%) was lower to that reported by other studies [2-3, 5-7] and similar to 0.13% reported by S. Awasthi et al [4]. There was no statistically significant difference in the prevalence between voluntary and replacement donors, which was at variance from other studies [5-7], which showed a higher positivity among replacement donors. There was statistically high significant difference in prevalence of Syphilis seropositivity over a period of four years study.

The prevalence of Malaria seropositivity (0.033%) was lower to that reported by a Tertiary teaching hospital in North India 0.20% reported by S. Awasthi et al [4]. There was statistically no significant difference in the prevalence between voluntary and replacement donors. There was statistically high significant difference in prevalence of Malaria seropositivity over a period of four years study.

CONCLUSION:-

Study concludes that the continuous and consistent predonation councelling and blood screening is double edged sword as at one end it identifies the new patients and carriers of diseases being apparently healthy in community, and at other end it prevents significant no. of patients to get accidental infection through blood transfusion, which is helpful to reduce the morbidity and mortality. Hepatitis B vaccination in community should be Promoted but it seems to be still low as it is reflected by increasing trends of seropositivity with time. It also shows significant difference between replacement donors and voluntary donors which may be attributable to the Possible Commercialization of replacement donors but it cannot be determined by our study as data is not collected to investigate this fact. So it is recommended that there is need of conducting studies to analyze.

TABLES

Table No. 1 Seropositivity in voluntary and replacement donors

Seropositivity	Voluntary Donor	Replacement Donor	Total
Positive	610	525	1135
Negative	23417	17569	40986
Total	24027	18094	42121

$\chi 2 = 5.041$; p value = 0.0248 (significant)

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Table No. 2 HIV positivity in voluntary and replacement donors

HIV Status	VD	RD	Total
Positive	64	58	122
Negative	23963	18036	41999
Total	24027	18094	42121

$\chi 2 = 1.049$; p value = 0.306 (non significant)

Table No. 3 HIV prevalence trend

YEAR	Positive	Percentage	Negative	Total
2009	17	.15%	11166	11183
2010	46	.39%	11535	11581
2011	30	.29%	10313	10343
2012	29	.32%	8985	9014
	122		41999	42121

$\chi 2 = 12.295$; p value = 0.0064 (significant)

Table No. 4 HCV positivity in voluntary and replacement donors

HCV Status	VD	RD	Total
Positive	56	35	91
Negative	23971	18059	42030
Total	24027	18094	42121

$\chi 2 = 0.752$; p value = 0.386 (non significant)

Table No. 5 HCV prevalence trend

YEAR	Positive	Percentage	Negative	Total
2009	3	.026%	11180	11183
2010	32	.27%	11549	11581
2011	16	.15%	10327	10343
2012	40	.44%	8974	9014
	91	.21%	42030	42121

$\chi 2 = 44.01$; p value = <0.05 (significant)

Table No. 6 HbsAg positivity in voluntary and replacement donors

HbsAg Status	VD	RD	Total
Positive	451	406	857
Negative	23576	17688	41264
Total	24027	18094	42121

$\chi 2 = 6.966$; p value = 0.0083 (significant)

Table No. 7 HbsAg prevalence trend

YEAR	Positive	Percentage	Negative	Total
2009	199	1.77%	10984	11183
2010	224	1.93%	11357	11581
2011	225	2.17%	10118	10343
2012	209	2.31%	8805	9014
	857	2.03%	41264	42121

$\chi 2 = 8.914$; p value = 0.03 (significant)

Table No. 8 Syphilis positivity in voluntary and replacement donors

VDRL Status	VD	RD	Total
Positive	28	23	51
Negative	23999	18071	42070
Total	24027	18094	42121

$\chi 2 = 0.096$; p value = 0.757 (non significant)

Table No. 9 Syphilis prevalence trend

YEAR	Positive	Percentage	Negative	Total
2009	0	0	11183	11183
2010	12	.10%	11569	11581
2011	22	.21%	10321	10343
2012	17	.19%	8997	9014
	51	.12%	42070	42121

$\chi 2 = 24.426$; p value = 0.00002 (significant)

Table No. 10 MP positivity in voluntary and replacement donors

MP Status	VD	RD	Total
Positive	11	3	14
Negative	24016	18091	42107
Total	24027	18094	42121

$\chi 2 = 2.643$; p value = 0.104 (non significant)

Table No. 11 MP prevalence trend

YEAR	Positive	Percentage	Negative	Total
2009	0	0	11183	11183
2010	0	0	11581	11581
2011	11	.106%	10332	10343
2012	3	.033%	9011	9014
	14	.033%	42107	42121

$\chi 2 = 24.21$; p value = 0.00002 (significant)

Table No. 12 Comparison with other studies.

STUDY	HIV	HCV	HBsAg	Syphilis	Malaria	Overall
Dechen C. et al., Gangtok, Sikkim, 2010	0.32%	0.27%	0.78%	0.27%	-	1.63%
Lt Col A Chattoraj et al., 2008	0.13%	0.19%	0.99%	0.62%	-	-
S. Awasthi, et al., North India, 2011	0.1%	0.83%	1.82%	0.13%	0.20%	-
Our study,2009-12	0.28%	0.21%	2.03%	0.12%	0.033%	2.69%

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