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Prevalence and Knowledge of Hepatitis B and Hepatitis C Infections Among Voluntary Blood Donors in Nairobi, Kenya

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ABSTRACT

Background objectives: Blood transfusion is a life-saving intervention in patient management. However, risks are involved which may lead to transmissions of hepatitis B and hepatitis C from donors to recipients. This study aimed at determining the prevalence, knowledge and risk factors associated with hepatitis B and hepatitis C infection. It also described the existing knowledge about infection impact and spread of HBV and HCV.

Methodology: This was descriptive type of study design adopting purposeful sampling technique.

Where every 6th voluntary blood donor was selected. Six millilitres (ml) blood samples was drawn from 384 voluntary blood donors aged 18-65 years. Chemiluminescent micro particle immunoassay technology was used to determine present of HBsAg and anti-hepatitis C in serum.

Results: There were 384 participants whose analysis recorded 1.0 % HBV prevalence and 0.3 % HCV. The prevalence of HBV was significant in both male and female voluntary blood donors VBD ($\chi 2=9.88$, df=2, P = 0.007). However, it was insignificant for HCV ($\chi 2=1.871$,df=1,P=0.349).Intravenous drug use was a major risk factor identified for HCV and HBV infection. Most voluntary blood donors 64% and 71 lack knowledge about hepatitis B and HCV respectively in terms modes of transmission, general information and risks of infection.

Conclusion: Despite strict selection targeting low risk groups there was 1.3% expression of HBV and HCV. Only 34% respondents had sufficient knowledge about hepatitis B and HCV transmission. Modes. Intra venous drugs was a major risk for HCV and HBV infection.

Keywords: Hepatitis, Risk, Knowledge, Transmission

INTRODUCTION

Blood transfusion a life-saving intervention in patient management [1]. However, risks are involved which may lead to transmissions of hepatitis B and hepatitis C viral infections from donor to recipient [2]. Hepatitis B virus and HCV are common infection and complications which result from blood transfusion [3,4]. The seroconversion is approximately 2% for HCV and 6-60% for HBV in cases of being a blood recipient [5]. Standard reliable results coupled with a working quality management system reduce errors and risks of transmitting infection to blood recipients. Interventions, such as standardized screening of donated blood, use of regular voluntary blood donors, and exclusion of high risk blood donors improve quality and availability of safe blood. Unnecessary transfusion and inappropriate utilization of blood contribute to Transfusion transmissible infection in developing nations [6].

Transfusion transmissible infections can be monitored and reduced if Reduction can also be achieved by having data on HBV and HCV prevalence, knowledge and risks. Two billion people are exposed to Hepatitis B virus, 350 million develop chronic Hepatitis B and over two million annual death according to World Health Organization estimates There are 177.5 million estimated infection of Hepatitis C in the world, half of infected people are in Africa [7,8]. African countries including Kenya have difficulties to access safe and adequate blood attributed to lack of quality manage-

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-ment systems, policies, standardized protocols and non-applicable use of confirmatory tests like polymerase chain reaction and Nucleic acid test. Hepatitis status un-awareness, lack of standardized and centralized screening methods in Kenya make blood a potential source of TTIs. This is against WHO recommendations that require all countries to have working quality management systems and to implement centralized and standard blood screening policy as envisioned by WHO. Standardized and centralized screening of donated blood gives precise and reliable results.

The aim of this study was to establish the prevalence of hepatitis B and HCV, risks and existing knowledge among Kenyan voluntary blood donors. In Kenya Hepatitis B virus prevalence is estimated to be at 5-8% in the general public [9]. Whereas transmission prevalence of 3.2% and 2.4% HCV and HBV respectively [10] was reported in Nyeri satellite among voluntary blood donors. The prevalence of HCV was reported to be less than 1% (Karoney et al., 2013) in Kenya, review of Africa hepatitis infection.

In Sub-Sahara Africa the established risk ratio is 2.5 and 4.3 of HCV and HBV infection respectively of every 1000 units of transfused blood [12]. This ratio may be as a result of relaxing stringent rules used for selecting blood donors, unreliable blood screening techniques. Other issues like inappropriate utilization of blood brought about by policies that do not describe or guide on correct use of blood.

Lack of awareness to past and recent infection and latency stages of HBV and HCV complicates selection of health voluntary blood donars. The risk ratio of transmitting HBV through blood transfusion are potentially high in HBV latent infection. In Sub Saharan Africa 12.5% patients who receive blood transfusion are at a risk of post transfusion infection like Hepatitis B and Hepatitis C [13]. Such trends creates lasting reservoirs for infectious diseases such as HCV and HBV in the general population. New infection has negative impact on the economy and puts pressure on medical care, increase dependency and loss of productive persons. Centralized and standardized screening of blood greatly improves quality and safety of blood; however, the contrary happens without established standards. To ensure quality and safe supply of blood there must be standards that must be complied by both private and public transfusing facilities. During window period the results of HBsAg assay are negative however detection of HBV DNA reduces transmission of HBV during acute window period. The disappearance of HBsAg in chronic occult HBV infection can lead to transfusion of HBV. To help reduce infection transfer, latent screening and confirmatory tests are critical as a screening component.

METHODS

Study design

Across sectional, descriptive type of study design was adopted. The study population were voluntary blood donors whose data were collected from March 2017 to June 2017 within Nairobi. A total 2135 blood donors volunteered whereas only 384 were enrolled. Basically, donors must be 18-65 years, be in good health, a pre donation haemoglobin (Hb) of ≥ 12.5g/dl. Be ≥ 50 kgs and satisfy risk assessment section on the questionnaire. They also must have had a snack in last six hours and without history of fainting in last one month. All voluntary donors who did not meet above condition were excluded.

Laboratory diagnosis of Hepatitis B and Hepatitis C virus

Diagnosis of HBV and Hepatitis C virus depended on the detection of HBsAg and anti HCV in blood donor's serum. Chemiluminescent micro particle immunoassay technology (CMIA), with flexible assay protocols referred to as chemiflex was used, for the quantitative determination of HBsAg in serum. Chemiluminescent micro particle immunoassay was used to determine the present of antibodies and analyte in the samples. This reaction was measured as relative light units (RLUs), which means relationship exists between HBsAg in the sample and the RLUs detected.

Diagnosis of HCV also depended on the detection of anti HCV in blood donor's serum. Chemiluminescent micro particle immunoassay technology (CMIA), with flexible assay protocols referred to as chemiflex was used, for the quantitative determination of anti-HBC in human serum.

The CMIA then measures the chemiluminescent emission over a predefined time period to quantitate the analyte concentration to determine qualitative interpretation or cut off. Resulting reaction is measured as RLUs, that is direct relationship exists between the amount of anti-HCV in the sample and the RLUs detected.

ETHICAL CONSIDERATIONS

Ethical approval was given by Kenyatta University Ethics and research Committee (KUERC). Permission to use donor results was given by the director Kenya National blood transfusion. For confidentiality and integrity, each volunteer blood donor signed a consent form was assigned a unique identification code and was assured that information collected will not be made public.

DATA ANALYSIS

The data was analyzed using Chi-square test with a confidence (CI) interval of 0.05. Demographic characteristics was analyzed using percentages and frequencies. The ages were placed in 5 groups with age difference of 10 years. Chi-square test was used to find the significance difference between voluntary donors infected by hepatitis age groups and knowledge about hepatitis transmission. The relationship in the occurrence of hepatitis in voluntary blood donors was found to be significant at P=0.05 for all test at 95% CI. Results analysis was done

using Statistical Packages for Social Statistics (SPSS) version 23.

RESULTS

Demographic characteristics of voluntary blood donors

A total of 384 voluntary blood donors aged 18 to 65 years and categorized into 18-25, 26-35, 36-45, 46-56, 56-65 years participated in the study. The mean age was 25.12 years with a SD of 6.963. There were 65.1% male and 34.9% female participants. More than half 68.2% participants were 18-25 years, 22.1% were 26-35 years, 7.3% were 36-45 years and 2.3% were 46-55 years. There was a reduction in number of voluntary blood donors with advance in age. Majority, 89.3% voluntary blood donors had college or tertiary education, 8.9% secondary education, 0.8% primary education **(Table 1)**.

Table 1. Demographics and education level of voluntary blood donors who donated blood at RBTC-Nairobi.

Age	Freq	Percent	Valid Percent	Cumulative Percent
18-25	262	68.2	68.2	68.2
26-35	85	22.1	22.1	90.4
36-45	28	7.3	7.3	97.7
46-55	9	2.3	2.3	100.0
Total	384	100	100	
Education				
Primary	3	0.8	0.8	0.8
High School	34	8.9	8.9	9.7
College	4	1.04	1.04	10.7
Tertiary	343	89.	89	98
Informal	0	0	0	100
Total	384	100	100	
Gender				
Males	250	65.1	65.1	65.1
Females	134	34.9	34.1	100
Total	384	100	100	
Occupation				
Employed	67	17.4	17.4	17.4
Business	104	27.1	27.1	44.5
Student	213	55.5	55.5	100
Total	384	100	100	

Prevalence of Hepatitis B virus and HCV among voluntary blood donors at RBTC-Nairobi

The overall prevalence of both HBV and HCV was at 1.3% among voluntary blood donors **(Table 2)**.

Table 2. Prevalence of Hepatitis B virus and HCV among voluntary blood donors at RBTC-Nairobi.

		Frequency	Percent	Valid Percent	Cumulative Percent
HBV Valid	Negative	380	99.0	99.0	99.0
	Positive	4	1.0	1.0	100.0
	Total	384	100.0	100.0	
HCV Valid	Negative	383	99.7	99.7	99.7
	Positive	1	0.3	0.3	100.0
	Total	384	100.0	100.0	

Prevalence of HBV and HCV in male and female voluntary blood donors at RBTC Nairobi

There were 250 male and 134 female voluntary blood donors enrolled. The study recorded a prevalence of 0.8% HBV in male and 1.5% in female VBDs. Prevalence of HCV was 0.3% among male and female voluntary blood donors **(Table 3)**. Seropositivity of ant HBsAg was significant in both female and male VBD (χ^2=9.88, df=2, P=0.007). Seropositivity of ant HCV was insignificant in both female and male VBD (χ^2=1.871, df=1, P=0.349). **(Table 3)**.

Table 3. Prevalence of HBV and HCV among male and female voluntary blood donors at RBTC Nairobi.

			HCV		Total	Exact Chi-Square Tests
			Negative	Positive		
Sex	Female	Count %	133 (34.7%)	1(100.0%)	134 (34.9%)	χ^2=1.871,
	Male	Count %	250 (65.3%)	0 (0.0%)	250 (65.1%)	df=1
Total		Count %	383 (100.0%)	1 (100.0%)	384 (100.0%)	P=0.349
			HBV			
			Negative	Positive		
Sex	Female	Count %	132 (98.5%)	2 (1.5%)	134 (100.0%)	χ^2=9.886,
	Male	Count %	248 (99.2%)	2 (0.8%)	250 (100.0%)	df=2,
Total		Count %	380 (99.0%)	4 (1.0%)	384 (100.0%)	P=0.007

Key
df-degree of freedom
χ^2 chi square
P ≥ 0.05 not significant
P = 0.001 significant

Association of predictor variables (Risks) with HBV and HCV infection among voluntary blood donors at RBTC-Nairobi

Out of 384 voluntary blood donors 1.3% had history of exposure to unsafe injection while 98.7% had no exposure history to unsafe injection. Six (1.6%) VBDs had been exposed to unprotected sex, 98.4% not exposed to unprotected sex (χ^2=0.800, df=1, P=0.004). Thirty, (7.8%) voluntary blood donors had used non-medical drugs like cocaine and marijuana (χ^2 =1.658, df =1, P= 0.198). Five (1.3%) VBDs had contact or stayed together with people with yellow eyes. Consent to sex in exchange for money as a risk, at least 1% VBDs gave or received money in favor of sex (χ^2 =0.974, df =1, P= 0.003). At least 3.1% VBDs

consented to sex with someone whose HBV and HCV status was unknown to them (χ^2 =0.130, df =1, P= 0.718). In conclusion 4.4% of voluntary blood donors had more than one sexual partner which meant risk to self and infecting others.

Table 4. Statistical association of predictor variables with HBV infection, among voluntary blood donors at RBTC-Nairobi.

		HBV Negative	Positive	Total	Exact Chi-square tests
History of exposure to unsafe injection	No	377 (98.7 %)	2(50 %)	379(98.7 %)	χ^2=2.679, df=2, P= 0.026
	Yes	5(31.3%)	0(0%)	5(31.00)	
	Do not know	0(0.0 %)	0(0%)	0(0.0 %)	
History of unprotected sex	No	374(98.4%)	4(100%)	378(98.4)	χ^2=0.800, df=1, P=0.004
	Yes	6(1.6%)	0(0%)	6(1.6%)	
History of non-medical drug use (marijuana & cocaine)	No	351(92.4%)	3(75%)	354(92.2%)	χ^2 =1.658, df=1, P=0.198
	Yes	29(7.6%)	1(25.0%)	30(7.8%)	
History of being in contact with people with yellow eyes	No	371(97.6%)	4(100%)	375(97.7%)	χ^2=0.097, df=2, P= 0.953
	Yes	5(1.3%)	0	5(1.3%)	
	Do not know	4(1.1%)	0 (0%)	4(1.0%)	
Consent to sex for exchange of money	No	375(98.7)	4(100%)	379(98.7%)	χ^2 =0.974 df=1, P=0.003
	Yes	4(1.1%)	0(0%)	4(1.0%)	
	Do not know	1(0.3%)	0(0%)	1(0.3%)	
History of consent to sex with unknown HBV/HCV status partner	No	368(96.8%)	4(100%)	372(96.9%)	χ^2=0.130, df=1 P=0.718
	Yes	12(3.2%)	0(0%)	12(3.1%)	
History to have suffered from STDs	No	375(98.7%)	4(100%)	379(98.7%)	χ^2 =0.053, df=1, P= 0.817
	Yes	5(1.3)	0(0%)	5(1.3%)	
Consent to sex with Irregular Partners	No	363(95.5%)	4(100%)	367(95.6%)	
	Yes	17(4.5%)	0(0%)	17(4.4%)	χ^2=0.187 df=1, P=0.665

Key
dt-degree of freedom
χ^2 chi square
P ≥ 0.05 not significant

P = 0.01 significant

Knowledge about Hepatitis B among voluntary blood donors

A standardized questionnaire with eleven closed end questions whose response were analysed to establish how much knowledge was there among voluntary blood donors was used. The respondents were allowed to mark "Yes", "No and "Don't Know" to respond to questions. From their responses, 51.25 % voluntary blood donors, were aware HBV was acquired through unsafe injections whereas 48.75% being unaware. In the same study, it was noted that only 32.55 % voluntary blood donors were aware that HBV was a lifelong infection whereas over 67.44% were unaware. It was also found out that most voluntary blood donors 71.35 % were not informed about or being aware of HBV complicating to liver cancer and cirrhosis. The study recorded that there were only 36.72% of the respondents aware of HBV vaccine availability. Treatment could cure hepatitis B infection however only 42.19%) voluntary blood donors knew HBV could be cured if treated. This study noted that there were only 31% of the respondents who were aware of Hepatitis B transmission via sharing of contaminated syringe and needles.

This study also recorded that only 38.8%voluntary blood donors knew HBV was transmitted from mother to child. Whereas majority 61.2% were not informed or not aware. In overall, majority 235 (61.19%) respondents had not been informed how perinatal HBV transmission occurs. Another common mode of HBV transmission was via unprotected sex; however, only 35.7% voluntary blood had information about this form of transmission. Transmission of HBV can also occur through transfusion of not properly screened blood and its products. At least 144 (37.7%) voluntary blood donors knew HBV was transmitted through transfusion of blood and blood products. In overall, the general knowledge about hepatitis B virus was below average as only 36% respondents were found to have sufficient information about HBV modes of transmission. Majority 64% respondent's lack general knowledge about HBV.

Table 5. Existing general knowledge about hepatitis B virus among voluntary blood donor at RBTC Nairobi.

		HBV negative	Positive	Total	Exact Chi-Square Tests
Hepatitis B is a viral infection	No	65(17.1%)	1(25.0%)	66 (17.2%)	χ^2=1.986, df=2, P= 0.016
	Yes	194(51.1%)	2(50.0%)	196 (51.0%)	
	Do not know	121(31.8%)	12(5.0%)	122 (31.8%)	
Hepatitis B is a lifelong infection	No	57(15.0%)	2(50.0%)	59 (15.4%)	X^2 =4.110, df=2 0.013 P= 0.013
	Yes	124(32.6%)	1(25.00%)	125 (32.60%)	
	Do not know	199 (52.40%)	1(25.00%)	200 (52.10%)	
Hepatitis B infection leads to liver Cancer & liver Cirrhosis	No	84(22.10%)	3(75%)	87 (27.7%)	X^2=6.512, df=2, P= 0.039
	Yes	110(28.90%)	0(0%)	110 (28.6%)	
	Do not know	186 (48.9%)	19(25%)	187 (48.7%)	P= 0.039
Hepatitis B can be Prevented by Vaccination	No	50 (13.2%)	1(25.0%)	51(13.3)	χ^2=1.117 df=2, P=0.572
	Yes	139 (36.6%)	2(50%)	141(36.7%)	
	Do not know	191(50.3%)	1(25%)	192 (50.00%)	P= 0.572
Hepatitis B is curable	No	60(17.6%)	9(20.9%)	69 (18.0%)	χ^2=1.096, df=2 P= 0.567
	Yes	142(37.0%)	20(46.5%)	162 (42.5%)	
	Do not know	139(40.8%)	14(32.6%)	153 (39.8%)	
Hepatitis B has	No	80(21.1%)	3(75.00%)	83 (21.6%)	χ^2=6.982,

symptoms	Yes	109 (28.7%)	0(0.0%)	109 (28.40)	df=2, P=0.03
	Do not know	191(50.3%)	1(25.00%)	192 (50%)	
Hepatitis B can be transmitted by Contaminated needles	No	157(41.3%)	2(50.00%)	159 (41.40%)	χ^2=0.129, df=2 P= 0.938
	Yes	118(31.10%)	1(25.00%)	119 (31%)	
	Do not know	105(27.60%)	1(25.00%)	106 (27.6)	
Hepatitis B can be transmitted through unprotected sex	No	143(37.60%)	3(75.00%)	146(38.00%)	χ^2=2.880, df=2, P= 0.237
	Yes	135(35.5%)	0(0%)	135 (35.20%)	
	Do not know	102(26.80%)	1(25.0%	103 (26.80)	
Hepatitis B can be transmitted through perinatal means	No	147(38.7%)	3(75.00%)	150 (39.10)	X^2=2.920, df=2, P=0.232 P= 0.232
	Yes	149(39.2%)	0(0%)	149 (38.8%)	
	Do not know	84(22.10%)	1(25%)	85 (22.1%)	
Hepatitis B can be transmitted by Blood and blood products	No	139(36.60%	3975%)	142 (37%)	X^2=3.096, df=2, P=0.213 P=0.213
	Yes	144(37.90)	0(0%)	144 (37.5%)	
	Do not know	97(25.50)	1(25%)	98 (25.50)	
Hepatitis B can be transmitted through fecal oral means	Yes	185(48.7%)	2(50%)	187 (48.7%)	X^2=1.378, df=2, P= 0.502
	Do not know	81(21.30)	0(0%)	81 (21.1%)	
	Yes	185(48.7%)	2(50%)	187 (48.7%)	

Key
df-degree of freedom
χ^2 chi square
$P \geq 0.05$ not significant
$P = 0.01$ significant

Current existing general knowledge about Hepatitis C among voluntary blood donors at RBTC-Nairobi

A standardized questionnaire with 11 closed end questions was used to collect information whose data was analyzed to establish how much knowledge was available about HCV. The respondents marked "Yes", "No and "Don't Know" to respond to the questions. The findings were, only (37%) voluntary blood donors acknowledged that HCV was a virus and it's a viral infection.

Out of 384, only 70 (10.70%) voluntary blood donors acknowledged that HCV was a lifelong infection. However, most respondents (89.3 %) had insufficient information or knowledge, how HBV was a lifelong infection.

Out of 384, 76 (19.8%) voluntary blood donors acknowledged that HCV could lead to liver cancer or liver cirrhosis, however, 80.2% voluntary blood donors were not able to acknowledge that HCV could lead to liver cancer or cirrhosis. This was be attributed to lack information on how HCV infection leads to liver cancer or liver cirrhosis.

This study recorded that there were 39.52% voluntary blood donors aware that HCV was transmitted by being transfused with contaminated blood and blood products. However overall majority 233 (60.67%) VBDs lack knowledge or information how this occur when all transfused blood is screened.

Hundred and twenty nine (33.59%) voluntary blood donors acknowledged that HCV could be cured if treatment was

given. However, majority (66.40%) VBDs knew that HCV was not curable.

Out of 384 only 93 (24.22%) voluntary blood donors acknowledged that HCV had signs and symptoms however, majority 226 (58.85%) had no idea or any knowledge. Respondents' knowledge about HCV infection was below expected levels among voluntary blood donors. Only 27.48% voluntary blood donors had excellent knowledge, whereas 71.2 % had poor knowledge about HCV transmission.

This study noted that 18% voluntary blood donors thought that HCV could be transmitted via faecal oral route while majority 82% knew that transmission does not occur this way.

Table 6. Current existing general knowledge about Hepatitis C among voluntary blood donors at RBTC Nairobi.

			Negative	Positive		
HCV is a Viral Infection	No	Count%	48(12.5%)	0(0.0%)	48(12.5%)	$\chi2=1.709$
	Yes	Count%	141(36.8%)	1(100%)	142(37.00%)	df=2
	Do not know	Count%	194(50.7%)	0(0.0%)	194(50.50%)	p=0.495
HCV is a Lifetime Infection	No	Count%	95(24.8%)	0(0.0%)	95(24.7%)	$\chi2=4.497$
	Yes	Count%	69(18.0%)	1(100%)	70(18.2%)	df=2
	Do not know	Count%	219(57.2)	0(0.0%)	219(18.2%)	p=0.182
HCV can lead to liver Cancer/Cirrhosis	No	Count%	40(10.4%)	0(0.0%)	40(10.4%)	$\chi2=4.063$
	Yes	Count%	75(19.6%)	1(100%)	76(19.8%)	df=2
	Do not know	Count%	268(70.0%)	0(0.0%)	268(69.8%)	p=0.131
HCV can be Cured	No	Count%	45(11.7%)	0(0.0%)	45(11.7%)	$\chi2=1.982$
	Yes	Count%	128(33.4%)	1(100%)	129(33.6%)	df=2
	Do not know	Count%	210(54.8%)	0(0.0%)	210(54.7%)	p=0.371
HCV has Symptoms	No	Count%	65(17.00%)	0(0.0%)	65(16.9%)	$\chi2=3.137$
	Yes	Count%	92(24.00%)	1(100%)	93(24.2%)	df=2
	Do not know	Count%	226(59.00%)	0(0.0%)	226(58.9%)	p=0.208
HCV can be transmitted via Contaminated Needles	No	Count%	36(9.4%)	0(0.0%)	36(9.4%)	$\chi2=2.127$
	Yes	Count%	122(31.9%)	1(100%)	123(32%)	df=2
	Do not know	Count%	225(58.7%)	0(0.0%)	225(58.6%0	p=0.414
HCV can be transmitted via Un protected Sex	No	Count5	156(40.7%)	1(100%)	157(40.9%)	$\chi2=4.150$
	Yes	Count%	41(10.7%)	0(0.0%)	41(10.7%)	df=2
	Do not know	Count^	186(48.6%)	0(0.0%)	186(48.4%)	p=0.0516
HCV can be trans via Perinatal	No	Count%	117(30.5%)	1(100%)	118(30.7%)	$\chi2=2.260$
	Yes	Count%	51(13.3%)	0(0.0%)	51(13.3%)	df=2
	Do not know	Count%	215(56.1)	0(0.0%)	215(56%)	p=0.0440
HCV can be trans via Blood & Products	No	Count%	34(8.9%)	0(0.0%)	34(8.9%)	$\chi2=1.547$
	Yes	Count%	150(39.2%)	1(100%)	151(39.3%)	df=2
	Do not know	Count%	199(52.00%)	0(0.0%)	199(51.8%)	p=0.461
HCV can be trans via Fecal Oral mode	No	Count%	67(17.5%)	0(0.0%)	67(17.4%)	$\chi2=0.550$
	Yes	Count%	69(18.00%)	0(0.0%)	69(18%)	df=2
	Do not know	Count%	247(64.5%)	1(100%)	248(64.6%)	p=0.760

Key
df- degree of freedom
χ^2 chi square

$P \geq 0.05$ not significant
$P = 0.01$ significant

DISCUSSION, CONCLUSION & RECOMMENDATIONS

Kenya National Blood Transfusion Service (KNBTS) depends on voluntary blood donors for blood. From this study most voluntary blood donors were below 35 years whose majority were aged 18-25 years at68.2%. The results compare well with [14], in Ghana where 50.2 % voluntary blood donors were below 35 years, 64.4% were 19 to 35 years [15] and below 35 years in Gabon. Number of donors aged above 36 years was only 9.6%. The results compare well to that of [16], where less than 10% voluntary blood donors were >40 years of age this contrast with over 40-45% voluntary blood donors aged above 40 to 50 years in the USA [17]. In this study males formed majority (64.8%) voluntary blood donors compared to female (25.2%) voluntary blood donors. Most females were deferred due to low hemoglobin, body physiological changes and pregnancy [18]. They are prone to vasovagal reactions which affects their experience as blood donors. Deferral to donate diminishes likelihood of donor return, especially for first-time blood donors or longer period allowed before next donation.

Women have difficulties when blood is withdrawn and fear adverse and vasovagal reaction during or after donation than men. Materials used in blood donation such as needles, sight of blood and the feeling of discomfort make women defer themselves from blood donation. Fewer women give blood because it is not their relative who needs blood [19]. Less men were deferred giving an opportunity to most of them being allowed to donate because their hemoglobin was ok and willingness to donate. Men are more individualistic unlike women who are altruistic. In Ghana [20] reported 2.05% female and 97.95% male donors. The difference in respondents was attributed to difference in study design, number of participants and entry criteria used. Geographical location may also affect outcome due to different believes and myth about blood. The selection criterial used and type of population approached impact on respondents. Some religion and myth about blood affect number of voluntary blood donor turnout. Low level of both hepatitis B and HCV could be attributed to level of education. However, this contradicts the finding of this study where the general knowledge among respondents about HBV and HCV 37%. This indicates an existing gap which need to be filled by educating the public on both Hepatitis B and HCV.

Prevalence of Hepatitis B and HCV among voluntary blood donors at Regional Blood Transfusion Center, Nairobi

This study recorded, 1.3% prevalence of hepatitis B and hepatitis C among voluntary blood donors, 1.0 % and 0.3% respectively for Hepatitis B and Hepatitis C. Prevalence of of 1.5% HBV was recorded among voluntary blood donors aged 18-25 years. Prevalence of hepatitis B in this age group was higher than overall prevalence of HBV. This results indicated that HBsAg carriage is higher among young people. Early infection may complicate in both HBV and HCV leading to liver cancer and liver cirrhossis. Prevalence of HBV and HCV was not significant ($\chi 2=1.882$, df=3, P=0.597). Low prevalence of both HCV and HBV at RBTC Nairobi was probably attributed to strict selection and health talk segment given to potential VBDs before blood donation. In addition, low risk groups which include faith-based organization, institution, schools colleges and disciplined forces are used. Low prevalence can also be attributed to self-exclusion as a result of pre-donation counselling and 100 % voluntary blood donation.

More so, Kenya is classified by WHO as low prevalence country. In this study 90.6% voluntary blood donors had tertiary education; however, this did not reflect on how much knowledge was available about HBV and HCV infection. It is believed educated people make informed decision and understand the risks and control measures of infection. In addition, they also engage in positive health behaviors that protect their lives. In a study at Mbagathi hospital [21] said that education play a major role and has a big impact on spread and control of infection. The finding are inconsistent with report from a study by [22] which reported more than half 2.1% HBV in the general population. Kamande et al., [10] reported a 2.4 % HBV, Madhushree et al., [23] reported 0.4% HBV in India. In Uganda Hladik et al., [24] reported 3% HBV and 0.6% HCV, Varsha et al., [25] reported 1.79%. In Eritrea Siraj et al., [26] reported a 2.0%, 0.7% HBV and HCV respectively. The results are inconsistence to those of Asundula et al. [21] which reported HBV of 3.8% among pregnant women at Mbagathi hospital in Kenya. The results are also inconsistence to those of Jean et al. [16] which reported HBV of 3.9% among general population in Rwanda.

Results variation could be attributed to differences in geographical regions, different types of risk groups and the means of exposures involved. It could also vary depending on prevalence of hepatitis in the general population. The differences could also be attributed to study design, study population and the criteria for inclusion or exclusion. Globally there is variation in sero-prevalence of HCV, with lowest prevalence in United States (0.1%) and highest in Egypt 24.8%. In Morocco, Baha et al. [27] reported 0.62% HCV and 0.96% HBV prevalence, Fathi et al. [28] in Jordan. More so, there is concerted efforts to immunize every newborn child by the government which may have reduced this prevalence.

Risk factors associated with Hepatitis C infection among voluntary blood donors

Among the risks that were identified and associated with hepatitis C were; use of illicit drugs like marijuana and cocaine. At least 30 (7.8%) voluntary blood donors had used these drugs. However, this was insignificant ($\chi2$=0.085, df=1, P=0.922) in terms of prevalence or infection by hepatitis C among voluntary blood donors. Promiscuity, 3.9%, 3.1% sexual activity with people of unknown hepatitis background, 1.8 % sharing of contaminated needles and syringes. Contact with people having signs of infection by hepatitis 1.3%, 1% giving or receiving money to get sexual favors. Most risks were associated with peer pressure, social environment, belief that marijuana has medicinal value, curiosity and low perception of harm. The participant who had used nonmedicinal drugs had first used them while in school or college. This pattern suggested peer pressure influence to start doing drugs. Frequency in type of risks differ depending on the geographical location and also target population. The most significant risks in this study were engaging in unprotected sex, sex with multiple partners ($\chi2$=1.849, df=2, P=0.039, $\chi2$=0.829, df=1, p=0.046) respectively. More so unsafe injection ($\chi2$=02.233, df=2, p=0.027) and sexually transmitted infection ($\chi2$=0.908, df=1, p=0.013) were significant risks to HBV infection.

Existing general knowledge about hepatitis B infection among voluntary blood donors at RBTC-Nairobi

In this study we described the knowledge regarding HBV transmission modes, HBV infection, HBV risk factors, HBV signs and symptoms among voluntary blood donors at RBTC, Nairobi. Kenya. We also described the knowledge regarding HBV based on information known to voluntary blood donors. This information was whether HBV was a viral infection, lifelong infection, if it can be cured or treated and about prevention by vaccination. The knowledge among voluntary blood donors was evaluated by distributing a questionnaire with 11 closed end question about HBV. The respondents were required to mark "Yes", "No" or "Don't know".

It was generally observed that majority voluntary blood donors had poor knowledge regarding HBV treatment, was it a viral infection, lifelong infection and if it had a vaccine. There were only 34% voluntary blood donors with satisfactory knowledge whereas 66% had unsatisfactory knowledge. In regard to knowledge about HBV transmission, 38.2% of the voluntary blood donors had satisfactory knowledge, however, majority 61.8% had poor or unsatisfactory knowledge. This gives a picture about the extent of ignorant that exist about HBV transmission. The parameters that were considered were transmission via contaminated needles and syringes, unprotected sex, perinatal, transfusion contaminated of blood and blood products. Unprotected sex among adults has been known to be a common route of HBV transmission, however, in this study, 64.8% respondents disagree to this fact. More so, 48.7% of the respondents wrongly thought that HBV was transmitted via the feco-oral route.

Sharing of contaminated needles and syringe are well known modes of HBV transmission, however only 31% respondents agreed and 69% of the respondents disagreed with this fact. Transfusion with contaminated blood and blood products and through mother to child (perinatal) are other methods. However, 37.5 % and 38.8% voluntary blood donors respectively agree that HBV can be transmitted via this means. This results compare well with other studies [29]. This could be because, information about viral infection relating to HBV is not well known. They also compare well with other studies among pregnant women [30]. This results was attributed to insouciant knowledge about HBV, barrier to eliminating its transmission among pregnant mothers. Scientists [31] reported that perinatal transmission of hepatitis B is mostly in mothers with detectable HCV RNA in peripheral blood by PCR.

CONCLUSION

Despite strict selection and targeting low risk groups there is 1.3% expression of HBV and HCV (1.0% and 0.3% respectively) among voluntary blood donors. Intravenous drug use was a major risk factor for HCV and HBV infection among voluntary blood donors. There was lack of general knowledge and transmission of both HBV and HCV among voluntary blood donors was poor. There were only 34% respondents with sufficient general knowledge and sufficient knowledge about hepatitis B and HCV modes of transmission.

RECOMMENDATIONS

Establish a functioning blood donor data bank of all seronegative voluntary blood donors and encourage repeat donations by Kenya National Blood Transfusion Service. Promoting and rehabilitation of drug addiction could help reduce HBV or HCV transmission. Promoting public Education and awareness on HBV and HCV transmission, progression and lay down strategies to reduce infection to be implemented by the Kenya National Blood Transfusion Service (KNBTS).

FURTHER STUDIES

Carry out a country wide study in both voluntary blood donors and general public on prevalence and knowledge and risks about hepatitis B and hepatitis C viruses. Secondly to carry out genotyping in both HCV and HBV among voluntary donors in Nairobi region.

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