

Sero-Prevalence of HBs Ag, HCV and HIV among Blood Donors in Three Blood Bank Centers in Sana'a city: Yemen

Tawfique Al-Zubiery¹, Talal Alharazi^{2,*}, Hafez Alsumairy³, Adel Al-Zubiery⁴

¹Department of Medical Laboratory, Faculty of Medical and Health Science, Taiz University Al-Turbah branch

²Department of Clinical Microbiology and Immunology, Faculty of Medicine and Health Sciences, Taiz University

³Department of Clinical Microbiology and Immunology, Faculty of Medicine and Health Sciences, Taiz University

⁴Internal medicine medical specialist, Abha-Psychiatry hospital, KSA

Abstract

Objective: To determine the current prevalence of HBs Ag, Anti-HCV Ab and anti-HIV Ab among blood donors.

Methods: This descriptive study was conducted in three blood banks centers in Sana'a city. During the study period from January to November 2016, 11374 blood donor specimens were subjected for detection anti-HBs Ag, anti-HCV and anti-HIV, by using Cobas e 411 analyzer.

Results: The overall prevalence of HBs Ag, HCV and HIV among blood donors was (1.9%), (1.0%) and (0.3%) respectively. Out of 11374 blood donors screened, 11249 (98.9%) were males and 125 (1.1%) were females with mean of age 30 years. While, (1.6%), (0.9) and (0.0%) of females were seropositive for HBs Ag, HCV and HIV respectively. High prevalence rate of HBs Ag and HCV found among the age group more than 55(5.7%, 2.0%) and 26-35 years old (1.9%, 1.1%) respectively.

Conclusion: This study revealed less prevalence rate of HBs Ag, HCV and HIV among blood donors.

Corresponding author : Talal Alharazi, Department of Clinical Microbiology and Immunology, Faculty of Medicine and Health Sciences. Taiz University. Yemen. Email: alhraziali@yahoo.com

Keywords: Yemen; Hepatitis; HBV; HCV; HIV; Blood donors; Taiz University

Received: Oct 31, 2017

Accepted: Nov 28, 2017

Published: Dec 1, 2017

Introduction

Blood transfusions can save the life and recover the health, but it also increases the risk of blood borne infections to the recipients. However, many of patients do not have opportunities access to achieve safe blood transfusions, and every person must have equal access to safe blood. Hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), and syphilis infections are public health problems that share similar routes of transmission, such as sexual intercourse, blood or blood products transfusion, sharing needles, intravenous drug use, and maternally [1,2]

Other agents, namely transfusion transmitted virus (TTV), SENV (SEN virus), Human herpes virus-8 (HHV-8), Hepatitis G Virus (HGV), West Nile Virus and prions which are may pose to the safety of blood and plasma products [3].

Reports from different parts of the world, have been shown variation in the prevalence of HBS Ag (0.66-25%), HCV (1.0-13.3%), HIV (0.084-11.7%), and syphilis (0.95-4.7%) among blood donors respectively [1,4,5].

HBV and HCV infections have been associated with long-term morbidity and mortality due to complications like cirrhosis, portal hypertension, chronic liver diseases, and hepatocellular carcinoma [6,7].

The endemicity of infection is considered high in Yemen, where prevalence of positive HBsAg ranges from (8%) to (20%), and up to (50%) of the populations generally have serological evidence of previous HBV infection(8). Recently Alzubiery et al has reported that, (1.6%) and (4.1%) of blood donors were founded to be reactive for HCV and HBs Ag respectively [9,10]. Furthermore, most previous epidemiological studies were done in different cities in Republic of Yemen, showed the prevalence rates of HBs Ag and HCV antibodies are (10.5%) and (2.3%) in Sana'a, (4.75%) and (0.6%) in Aden, (5.6%) and (0.8%) in Hajjah, (26.3%) and (5.1%) in Soqatra respectively [11]. Therefore, the aim of our study was to determine the current prevalence rate of HBV, HCV and HIV among blood donors in Sana'a city.

Material and Methods

Study Design

This study is cross-sectional descriptive study.

Method

The study was conducted at the virology unit of the National Blood Transfusion and Research Centre (NBTRC), Blood Bank units of Al-Thawra Teaching Modern Hospital (TTMH), and Al-Gomhory Teaching Modern Hospital (GTMH). The hospital's laboratory uses Cobas e 411 analyzer to assay of anti-HBsAg, anti-HCV and anti-HIV antibodies. All blood donors were examined for blood pressure, pulse; hemoglobin concentration and other general health indicators. Apparently, healthy persons of ages 18 to 65 years with body weight above 45 kg would qualify for donations. During the study period from January to November 2016, a total 11374 blood donors who satisfied the qualifying criteria for the donation were enrolled in this study. Of these 6421 blood donors from NBTRC, 2896 from TTMH and 2055 from GTMH in Sana'a City. Relevant information of all the blood donors who donated whole blood during the period of study was recorded, including personal characteristics such as age, gender, and previous blood donation.

Five milliliters of blood was collected by standard aseptic technique from each study person by trained laboratory technicians with the help of 5 ml disposable syringe, and was transferred to a sterile test tube. The blood was allowed to clot and after centrifugation, all serum specimens were analyzed for the anti-HBs Ag, anti-HCV and HIV Ag-Ab, by Electrochemiluminescence (ECL) technique using the immunoassay Cobas e 411 analyzer (Roche ELECSYS®2010 GmbH; Germany) according to manufacture instruction.

Statistical Analysis

The prevalence of HBs Ag, anti-HCV, and HIV was determined from the proposition of seropositive individuals in the total donor population studied and was expressed as a percentage and other characteristics of sampled population were computed. A *p* value less than 0.05 was calculated to be statistically significant. The statistical difference was also evaluated by applying the Chi-square test. All the statistical analysis was done using the Statistical Package for Social Sciences (SPSS) software package version 20. (SPSS Inc. Chicago, Illinois', USAT).

Result

Out of 11374 blood donors screened in the study, 11249 (98.9%) were males and 125 (1.1%) were females with the mean age 30 years. HBs Ag, HCV and HIV among males were (1.9%), (1.0%), and (0.3%) respectively, compared to (1.6%), (0.9%), and (0.0%) among females with no statistically significant was found.

The result of recent study revealed that, the overall prevalence of HBs Ag, HCV and HIV among blood donors was 219 (1.9%), 112 (1.0%) and 33 (0.3%) respectively. However, the prevalence of HBs Ag, HCV and HIV varies from the health center to another. As seen in the (table 1), the prevalence rate of HBs Ag, varies in each center, where, the prevalence of HBs Ag in NBTRC, TTMH and GTMH was (2.2%), (1.9%) and (1.0%) respectively, the difference was found statistically significance ($p < 0.003$). A similar observation was found for HCV ($p < 0.000$), "where, (1.4%) and (0.5%) of anti-HCV Ab were detected among blood donors in NBTC and in each of TTMH and GTMH, respectively".

Moreover, (0.3%) of blood donors were seropositive for HIV in each of NBTRC and TTMH compared to (0.1%) of blood donors were seropositive for HIV in GTMH. Where, the difference in the result of HIV was found statistically insignificant.

The present study revealed that, (1.9%), (1.0%) and (0.3) of males and (1.6%), (0.9%) and (0.0%) of males were seropositive for HBsAg, HCV and HIV respectively, while, the difference in the result was statistically insignificant.

Higher prevalence rates of HBs Ag (5.7%) and HCV (1.9%) were found among subjects aged more than 55 years old as compared to other age groups followed by the age group 26-35 years old with an account 101 (2.0%), and 57 (1.1%) of donated blood found seropositive for HBsAg, HCV respectively. Furthermore, the prevalence HBs Ag, HCV and HIV, among blood donors aged 17 to 25 years old was 1.9%, 0.8% and 0.2%, respectively (Table 1).

Discussion

The result of this study revealed that, (1.9%), (1.0%) and (0.3%) of blood donors had HBs Ag, anti-HCV and anti-HIV respectively. "Higher prevalence rate of HBs Ag, HCV and HIV were reported by Ymele

et al [12], who, found (12.14%), (4.44%) and (1.44%) of blood donors had anti-HBs Ag, anti-HCV and anti-HIV respectively".

The present study showed that, the prevalence of HBs Ag less than half of a recent study conducted in Sana'a city[10], that could be related to the number of the population selected and the technique used. This study presented that, the prevalence rate of HBs Ag was less than that has been previously reported in Sana'a City [13,14], In addition, the prevalence of HBs Ag in our study is quite similar to that reported by Acar *et al* [15], and Nazar et al [16] , whereas, slightly less than that reported by Al-Rubaye et al [17], and Bashawri et al [18], who found that, (2.3%) and (2.58%) of blood donors have shown serological evidence for hepatitis B virus infection in Iraq and Saudi Arabia respectively. Moreover, higher prevalence rate of HBs Ag was reported in Syria (5.62%) [19], and Sudan (5.1%) [20]. In Jordan, Abed Al-Gani et al[21], who showed that, (1.4%) of blood donors had HBs Ag ,while, in Baghdad, Ataallah et al[22], found (0.6%) of blood donors HBs Ag. In addition, the prevalence rate of HBsAg among our population was more than that reported in India by Makroo et al [23], and Jadeja et al [24].

In previous study, Al-Zubiery et al reported that, out of total 3606 blood donors, 57 donors were found to be reactive for anti-HCV, giving an overall sero-positivity of 1.6% [9], compared to (1.0%) found to be reactive for anti-HCV in the present study. The difference in the result of recent study could be related to the number of the population and using Electrochemiluminescence (ECL) technique, which is a highly innovative technology that offers distinct advantages over the other detection techniques [25].

In this study, the prevalence of HCV is in agreement with that reported by Bashawri et al [18] in Saudi Arabia and quite similar to Al Waleedi *et al* in Aden city [26] and Moukoko et al [27] in Cameroon. However, the prevalence of HCV in the this study was more than that reported in Iraq (0.1%) [17], India (0.1%) [28] and Turkey (0.07%)⁽²⁴⁾. While, markedly higher prevalence was reported in Egypt by Awadalla et al (16.8%) [29] and Mohammed et al (6 - 38%) [30] .

Furthermore, the result of the present study showed that, the rate of HCV among age groups was ranged from 0.7% up to 1.9%. Higher prevalence of

Table1: Distribution of HBsAg, anti-HCV and anti-HIV among studied palpation categories in Sana'a Yemen.

Blood bank center	Total number		HBsAg				HCV				HIV			
	11374		Negative 11155 (98.1)		Positive 219 (1.9%)		Negative 11262 (99.0%)		Positive 112 (1.0%)		Negative 11341 (99.7%)		Positive 33 (0.3%)	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
NBTRC*	6421	56.5	6279	97.8	142	2.2	6336	98.6	87	1.4	6401	99.7	20	0.3
TTMH*	2896	25.5	2842	98.1	56	1.9	2883	99.5	15	0.5	2888	99.7	10	0.3
GTMH*	2055	18.0	2034	99.0	21	1.0	2045	99.5	10	0.5	2052	99.9	3	0.1
χ^2			11.7				20.7				1.9			
<i>P</i>			0.003				0.000				0.391			
Gender	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Male	11249	98.9	11044	98.1	217	1.9	11150	99.0	111	1.0	11228	99.7	33	0.3
Female	125	1.1	123	98.4	2	1.6	112	99.1	1	0.9	113	100.0	0	0.0
χ^2			0.1				0.04				0.04			
<i>P</i>			0.790				0.833				0.544			
Age group	N	%	N	%	N	%	N	%	N	%	N	%	N	%
18-25	3876	34.1	3801	98.1	75	1.9	3845	99.8	31	0.8	3867	99.8	9	0.2
26-35	5078	44.6	4977	98.0	101	2.0	5021	98.9	57	1.1	5061	99.7	17	0.3
36-45	1959	17.2	1926	98.3	33	1.7	1939	99.0	20	1.0	1953	99.7	6	0.3
46-55	408	3.6	401	98.3	7	1.7	405	99.3	3	0.7	407	98.8	1	0.2
> 55	53	0.5	50	94.3	3	5.7	52	98.1	1	1.9	53	100	0	0.0
χ^2			4.7				3.1				1.0			
<i>P</i>			0.317				0.545				0.910			

Notes: χ^2 : Chi-square, *p*: probability. ($\chi^2 \geq 3.84$, $p < 0.05$: significant). No: number, %; percentage

NBTRC* National Blood Transfusion and Research Centre; TTMH*Al-Thawra Teaching Modern Hospital; GTMH* Al-Gomhory Teaching Modern Hospital

anti-HCV antibody as compared to the present study was reported by Noubiapa et al [31], who showed that, the prevalence of anti-HVC antibodies among age groups was ranged from 2.9% up to 6.9%.

The present study revealed that 0.3% of blood donors had anti-HIV antibody. This is in agreement with other studies were conducted in Sana'a city (0.39%) [12] and north India (0.24%) [23], but less than that reported by Bazie et al [32], who showed that, the sero-prevalence of antibodies against HIV was positive in (0.7%) of blood donors. In addition, the result of the present study was higher than that reported by Acar et al [15] in Turkey (0.008%).

The present study showed that, 26/33 (79%) of total HIV seropositivity were detected among the first two age groups, from 18 up to 35 years old, of this 17/33 (51%) of HIV seropositivity was detected among 26-35 age group. This could be explained due to high sexual activity of this age group. Similar to this result was reported by Michel et al [33], who found that 9/10 (90%) of HIV among age group 19-45 years old, as well as, this finding is the same as that made in Nigeria by Aleruchi et al [34].

Recommendations

It is suggested that more attention should be given paid providing health education concerning risk factors and prevention of HBV, HCV and HIV infections to the general public.

Acknowledgments.

We would like to thank all coworkers in general and in particular all staff members in virology unit in the National Blood Transfusion and Research Centre in Sana'a Yemen. The authors are grateful to the members of the blood banks' teams especially, Manal Muckbil, Aymn AL Shahar, Eqtesad Al-Shibani, Mahyoub Hobieashi, Rasha Al Qubati, Amar.A.Jabir, Majdi.A.Saleh and Mohammed Al Qadi for technical help in each of Laboratory units of Al-Thawra Teaching Modern hospital and Al-Gomhory Teaching Modern hospital.

References

1. Butsashvili M, Tsertsvadze T, McNutt LA, Kamkamidze G, Gvetadze R, Badridze N. Prevalence of hepatitis B, hepatitis C, syphilis and HIV in Georgian blood donors. *Eur J Epidemiol.* 2001;17(7):693–695.
2. Uneke CJ, Ogbu O, Inyama PU, Anyanwu GI, Njoku MO, Idoko JH. Prevalence of hepatitis-B surface antigen among blood donors and human immunodeficiency virus-infected patients in Jos, Nigeria. *Mem Inst Oswaldo Cruz.* 2005;100(1):13–16.
3. D. Z. Egah, B. M. Mandong, D. Iya, N. E. Gomwalk, E. S. Audu, et al. Hepatitis C virus antibodies among blood donors in Jos, Nigeria. 2004;3(1):35–7.
4. Muktar HM, Suleiman AM, Jones M. Safety of blood transfusion: prevalence of hepatitis B surface antigen in blood donors in Zaria, Northern Nigeria. *Niger J Surg Res.* 2005;7(3):290–292.
5. Ejele OA, Erhabor O, Nwauche CA. Trends in the prevalence of some transfusion-transmissible infections among blood donors in Port Harcourt, Nigeria. *Haema.* 2005;8(2):273–7.
6. Drosten C, Nippraschk T, Manegold C, Meisel H, Brixner V, Roth WK, الخ. Prevalence of hepatitis B virus DNA in anti-HBc-positive/HBsAg-negative sera correlates with HCV but not HIV serostatus. *J Clin Virol.* 2004;29(1):59–68.
7. Modi AA, Feld JJ. Viral hepatitis and HIV in Africa. *AIDS Rev.* 2007;9(1):25–39.
8. Al-Shamahy H. Prevalence of hepatitis B surface antigen and risk factors of HBV infection in a sample of healthy mothers and their infants in Sanaa Yemen. *Ann Saudi Med.* 2000;20(5–6):464–467.
9. Al-Zubiery TK, Alharazi T, Alsumairy H, Jabir AA, Muckbil MJ, et al. Sero-prevalence of Anti-HCV among Yemenis Blood Donors Attending National Blood Transfusion and Research Centre in Sana'a: Yemen. *Int Blood Res Rev.* 2017;7(3):1–5.
10. Tawfique AlZubiery, Talal Alharazi, Hafez Alsumairy, Amar Jabir, Manal Muckbil, et al. Prevalence of HBsAg and anti-HBc among blood donors at the National Blood Transfusion and Research Center, Sana'a, Yemen. *WJPMR.* 2017;3(5):69–74.
11. Bajubair MA, Elrub AA, Bather G. Hepatic viral infections in Yemen between 2000-2005. *Saudi Med J.* 2008;29(6):871.
12. Fouelifack Ymele F, Keugoung B, Fouedjio JH, Kouam N, Mendibi S, Dongtsa Mabou J. High rates of hepatitis B and C and HIV infections among blood donors in Cameroon: a proposed blood screening

- algorithm for blood donors in resource-limited settings. *J Blood Transfus.* 2012;1–7.
13. Alodini AQ. Prevalence of Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) infections among blood donors at Al-Thawra Hospital Sana'a City-Yemen. *Yemeni J Med Sci.* 2014;6:16–20.
 14. Sallam TA, Tong CYW, Cuevas LE, Raja'a YA, Othman AM, Al-Kharsa KR. Prevalence of blood-borne viral hepatitis in different communities in Yemen. *Epidemiol Infect.* 2003;131(1):771–775.
 15. Acar A, Kemahli S, Altunay H, Kosan E, Oncul O, Gorenk L, وأح. HBV, HCV and HIV seroprevalence among blood donors in Istanbul, Turkey: how effective are the changes in the national blood transfusion policies? *Braz J Infect Dis.* 2010;14(1):41–46.
 16. Nazar HN, Nadia NN, Shazia NS, Zulfiqar AZ, Farhat AF. Prevalence of Hepatitis B and Hepatitis C in blood donors of Karachi. *Biomedica.* 2017;24(2):116–117.
 17. Al-Rubaye A, Tariq Z, Alrubaiy L. Prevalence of hepatitis B seromarkers and hepatitis C antibodies in blood donors in Basra, Iraq. *BMJ Open Gastroenterol.* 2016;3(1):e000067.
 18. Bashawri LAM, Fawaz NA, Ahmad MS, Qadi AA, Almawi WY. Prevalence of seromarkers of HBV and HCV among blood donors in eastern Saudi Arabia, 1998–2001. *Int J Lab Hematol.* 2004;26(3):225–228.
 19. Karim M, Lahham H. Prevalence of viral hepatitis B and C in Syria. *Syr Epidemiol Bull.* 2008;2(3):10–1.
 20. Nagi AM, Altyeb HA, Ahmed AM. Seroprevalence of Hepatitis B and C Viral Infections among blood donors in Shendi, River Nile State, Sudan. *Res J Med Med Sci.* 2007;2(2):122–126.
 21. Al-Gani FA. Prevalence of HBV, HCV and HIV-1, 2 infections among blood donors in Prince Rashed Ben Al-Hassan hospital in North region of Jordan. *Int J Biol Med Res.* 2011;2(4):912–6.
 22. Ataallah TM, Hanan KA, Maysoun KS, Sadoon AA. Prevalence of hepatitis B and C among blood donors attending the National Blood Transfusion Center in Baghdad, Iraq from 2006-2009. *Saudi Med J.* 2011;32(10):1046.
 23. Makroo RN, Hegde V, Chowdhry M, Bhatia A, Rosamma NL. Seroprevalence of infectious markers & their trends in blood donors in a hospital based blood bank in north India. *Indian J Med Res.* 2015;142(3):317–22.
 24. Jadeja P, Kaur A, Shekha H. Trend in seroprevalence of Hepatitis B virus infection among blood donors at a tertiary care centre of Rajasthan, India. *Natl J Med Res.* 2014;4(3):205–7.
 25. Mathew BC, Biju RS, Thapalia N. An overview of electrochemiluminescent (ECL) technology in laboratory investigations. *Kathmandu Univ Med J.* 2005;3(9):91–3.
 26. Al Waleedi AA, Khader YS. Prevalence of hepatitis B and C infections and associated factors among blood donors in Aden City, Yemen. *East Mediterr Health J.* 2012;18(6):624–9.
 27. Moukoko CEE, Sack FN, Same EGE, Mbangue M, Lehman LG. HIV, HBV, HCV and *T. pallidum* infections among blood donors and Transfusion-related complications among recipients at the Laquintinie hospital in Douala, Cameroon. *BMC Hematol.* 2014;14(5):1–9.
 28. Bommanahalli B, Javali R, Mallikarjuna S, Gouda K, Siddartha K, Shashikala KP. Seroprevalence of hepatitis B and hepatitis C viral infections among blood donors of Central Karnataka, India. *Int J Med Sci Public Health.* 2014;3(3):285–8.
 29. Awadalla HI, Ragab MH, Nassar NA, Osman MAH. Risk factors of hepatitis C infection among Egyptian blood donors. *Cent Eur J Public Health.* 2011;19(4):217–21.
 30. Nafeh MA, Medhat A, Shehata M, Mikhail NN, Swifee Y, et al. Hepatitis C in a community in Upper Egypt: I. Cross-sectional survey. *Am J Trop Med Hyg.* 2000;63(5):236–241.
 31. Noubiap JJN, Joko WYA, Nansseu JRN, Tene UG, Siaka C. Sero-epidemiology of human immunodeficiency virus, hepatitis B and C viruses, and syphilis infections among first-time blood donors in Edéa, Cameroon. *Int J Infect Dis.* 2013;17(10):e832–e837.

32. Bazie EA, Ali MA, Hamza HB, Magzoub OS, Salih MSM, Haroun BE. Sero-prevalence of viral transfusion-transmissible infections among blood donors at Kosti Teaching Hospital, White Nile State/Sudan. *Int J Curr Microbiol App Sci.* 2015;4(5):1132–1138.
33. Kabamba N. Michel, Bwana K. Ignace, Kilolo N.U. Elie, Kalonji C. Deddy, Kabyla I. Benjamin, et al. HIV and HBV Seroprevalence in Volunteer Blood Donors in Lubumbashi. *SOJ Immunol.* 2015;4(5):1–3.
34. Aleruchi, O., Peterside, N. F., Ezekoye, C.C. Seroprevalence of HIV infection among blood donors at the university of port Harcourt teaching hospital, Rivers state, Nigeria. *Glob J Biol Agric Health Sci.* 2014;3(2):1–7.