Journal of medical & pharmaceutical Sciences
Volume (4), Issue (1) : 30 Mar 2020
P: 111 - 126
ISSN: 2522-333X
مجلة العلوم الطبية والصيدلانية
المجلد (4)، العدد (1) : 30 مارس 2020 م
ص: 111 - 126

Prevalence of Hepatitis B Virus Infection and Associated Factors Among Blood Donors in 48 Hospital Sana'a City- Yemen During 2016

Naif Tawfiq Alnwany
Faculty of Medicine || National University of Malaysia (UKM)

Abstract: Aim: This study was conducted to determine the prevalence of hepatitis B virus (HBV) and associated factors. Method: A cross- sectional study was conducted on randomly (simple random sample according to previous sero-prevalence HBV in population) selected 500 blood donors from who came to the blood bank service in 48 Hospital in Sana'a between October 2016 to Aug 2016 and were interviewed face to face, then data was collected by using questionnaire and blood samples collected after that using enzyme linked immunosorbent assay technique. questionnaire consisted of three sections (A) demographics, (B) associated factors and (C) blood sample results. Results and conclusion: The prevalence of hepatitis B virus infected was 2.6%. Only three factors in simple and multiple logistic regression were statistically significant with prevalence of HBsAG. Multiple logistic regression analysis showed that blood donors who had history of: dental treatment, cupping and malaria infection were more likely to infect with hepatitis B virus infected compared to those without history of: dental treatment, cupping and malaria infection 7.8%, 7.3 % and 7.5 % respectively. The rest of factors failed to achieve any statistical significant with prevalence of HBsAG. Hepatitis b is hyper endemic in Yemen, this need application of infection control policies in dental clinics, cupping centers, inject Hepatitis B virus vaccine and control of malaria in endemic areas.

Keywords: Hepatitis B virus, blood donors, Sana'a.

انتشار عدوى فيروس الكبد الوبائي ب والعوامل المرتبطة به بين المتبرعين بالدم في مستشفى 48 مدينة صنعاء - اليمن خلال عام 2016م

نايف توفيق النواني
كلية الطب || الجامعة الوطنية الماليزية

الملخص: هدفت هذه الدراسة لتحديد نطاق انتشار فيروس الكبد الوبائي بي والعوامل المرتبطة به، واستخدمت الدراسة المنهج الوصفي المسحي بالعينة؛ حيث أجريت دراسة مقطعية على 500 من المتبرعين بالدم تم اختيارهم عشوائيا من الأشخاص الذين جاءوا الى خدمة بنك الدم في مستشفى 48 في صنعاء ما بين يوليو وأغسطس من عام 2016 م، وقد تمت مقابلتهم وجها لوجه، ثم تم بعد ذلك جمع البيانات بواسطة استخدام الاستبانة وعينات الدم وتم استخدام عينات الدم و تقنية (ELISA) مقايسة التميز المناعي المرتبط بالأنزيم، كما تكونت الاستبانة من ثلاثة أقسام وهي: التركيبة السكانية، والعوامل المرتبطة، ونتائج عينة الدم.
وكشفت النتائج أن نسبة انتشار الإصابة بفيروس التهاب الكبد الوبائي بي 2.6%، حيث كانت ثلاثة عوامل فقط في الانحدار اللوجستي المتعدد والبسيط ذات دلالة إحصائية مع انتشار مولد الضد السطحي لالتهاب الكبد بي. وقد أظهر تحليل الانحدار اللوجستي المتعدد أن المتبرعين بالدم الذين تعرضوا مسبقا لعلاج الأسنان والحجامة وعدوى الملاريا هم أكثر عرضة للإصابة بعدوى فيروس التهاب الكبد الوبائي بي مقارنة بالذين لم يتعرضوا مسبقا بنسبة (7.5%، 7.3% ، 7.8%) على التوالي، كما فشلت بقية العوامل في تحقيق أي أهمية إحصائية عن مدى انتشار مولد الضد السطحي لالتهاب الكبد الوبائي بي .فيروس التهاب الكبد بي مستوطن في اليمن الأمر الذي يتطلب

خطوات وقائية عاجلة من السلطات الصحية لمنع هذه الظاهرة من خلال تطبيق سياسات منع ومكافحة العدوى في عيادات الأسنان ومراكز الحجامة وحقن اللقاح ضد فيروس الكبد بي؛ في جميع المرافق الصحية وتنفيذ الخطة الاستراتيجية لمكافحة الملاريا في المناطق الموبوءة .

الكلمات المفتاحية: فيروس التهاب الكبد الوبائي بي، المتبرعين بالدم، صنعاء.

Introduction

Blood donation and its transfusion is important service in the healthcare system to ensure safety, efficiency and accessibility of blood supply at all levels and blood transfusion saves millions of lives in world and decrease morbidity each year. Blood transfusion without screening and safety keeps the patient at risk due to acquiring many transfusions transmitted infections like hepatitis viruses (HBV, HCV), human immune-deficiency viruses (HIV) and other infections (1). The average prevalence of chronic HBV infection worldwide is still high prevalence where prevalence estimated less than 1% in developed countries and 2-10% in developing countries. This reflects the application of quality policies in health care system such as implementing vaccination programs this leading to very low HBV prevalence in developed countries. The prevalence of HBV is estimated at 1-3% in the EMRO and middle eastern countries and according to the WHO has defined prevalence of < 2%, 2-8%, and > 8% as low, intermediate, and high prevalence of HBV, respectively (2) where countries that have less than 1% are Iraq (3), Iran (4) and Jordan (5), while countries that have more than 1% are Egypt (6), Lebanon (7), Cyprus, Djibouti, Pakistan, Turkey, Yemen and Saudi Arabia (8).

In 2012 in Yemen, the prevalence of hepatitis B surface antigen (HBsAG) was 5.1%, using multivariate analysis, history of blood donation, blood transfusion, dental treatment, cupping, malaria infection and surgery were independent predictors of hepatitis B infection (9). The prevalence rates of HBsAG in developing countries are higher than that reported in developed countries (10).

Hepatitis B virus (HBV) infection is a major health problem in most countries of the world and progress to chronic disease, disability, 57% of liver cirrhosis and death, especially in Asia, the Middle East, and Africa, about two billion people worldwide have been infected with hepatitis B virus, more than360 million have chronic infection and 600,000 die every year due to HBV related liver disease or hepatocellular carcinoma (11). In Yemen, hepatitis B virus are major risk for hepatocellular carcinoma occurrence (12).

The proportion of donors with hepatitis and the risk factors associated with it among healthy individuals may reflect the proportion of chronic hepatitis B virus infection in the general population. The awareness of the importance of blood application of quality policies that leading to control in the transmission of hepatitis B virus and also helped to decrease the spread HBV. Strategies and health quality policies have been shown to be effective method of preventing as infection. Therefore, quality policies to prevent this infection must be based on quality of data as information about prevalence and associated

factors of this infection. Therefore, this study was conducted to determine the prevalence of hepatitis B virus and its associated factors among blood donors in 48 Hospital, Sana'a, Yemen. As study may raise awareness related to the need for putting the planning and action to prevent HBV transfusion in Yemen.

Materials and methods

Study area

Study was conducted at blood bank in 48 Hospital which is located in south of the capital Sana'a that established in October 2008, this Hospital is following of the defense ministry, the blood bank in 48 Hospital was established in same time of 48 Hospital was established. On average the blood donor was 10, 300 per day, per month respectively. The blood bank in 48 Hospital had degreed of ESO in 2011 therefore, 48 Hospital is the best Hospital in Yemen. All medical services in 48 Hospital is free.

Study design and period

Across sectional study design was used among volunteer blood donors from October to Aug 2016.

Study population and sample size

This study was conducted among all blood donors who came to the blood bank in 48 Hospital in Sana'a between October 2016 to Aug 2016. 500 volunteer blood donors between 18 and 65 years of age who come to blood bank. In reference to local study (10) and using a formula (13), a total 480 donors were required for this study. After considering missing data or non-response, 5% were added giving total sample size of 500 donors with 95% confidence and 80% statistical power.

Inclusion criteria

All age group from 18 to 65 years who were healthy and able to donate blood.

Exclusion criteria

People with hemoglobin level below 12 mg\dl, weight <50 kg, recent history of operation, current history of medication, serious disease, people who donate blood during less than three months, people who smoke cigarette during 12 hours, people who sleep less than 6 hours, people who refuse to give informed consent.

Sampling method

Because of war, mobilization of community (illiteracy, primary school, secondary school, post-secondary school, military, farmer, driver, hand worker) in the capital Sana'a another city in Yemen were conducted though the system(quality) that blood bank establishes, also volunteer who come to blood

bank without mobilization included in this study. all volunteer blood donors who donate in blood bank during the study period were included in the study and the total sample (convenient sampling) number take every day until the sample was completed. screening of donors were performed and recorded for all volunteer blood donors to see their eligibility for donation. Any volunteer did not meet the criteria for blood donation were excluded from the study.

Study tools

A set questionnaires was used to collect data. The questionnaire was pre-tested in the study area in order to test the face validity. The questionnaire was filled by face to face interview by researcher for those who could not read and write. The final questionnaire which consisted of three sections was then distributed to selected blood donors. The questionnaire included the following sections: (A) sociodemographic data such as age, gender, marital-status, level of education, residency, occupation and income, section (B) a 12 items questionnaire about past history such as history of:

blood transfusion, number blood transfusion, previous surgery, family jaundice, dental treatment, used of shaving tool, type of shaving tool, hemodialysis, cupping, hepatitis B vaccination, malaria infection (by asking the participants whether they had ever had physician- diagnosed malaria) and chewed of kat, section (C) a set of data sheet to capture blood samples results such as HBsAG (negative or positive) collected from blood donors at the center blood bank . Testing of blood samples (specimens) was investigated at the laboratory of virology unit of the center blood bank. Blood was screened for HBsAG and HBsAG that was positive test was analyzed for 1gm-anti-HBc, using enzyme-linked immune-sorbent assay (ELISA), (Elecys-Hitachi High–Technology corporation,2010, Tokyo, Japan). Questionnaire was numbered to identify those who have respond and or not and after donors agrees to participation in the study, he sign a consent form, after fill all the questionnaire from volunteers, blood drown by collecting bag. About 5 ml of blood sample was collected from the collection bag using a sterile capped tube. The blood was centrifuged and plasma was separated and stored at 2 to 8 c until it was tested. after ensuring the completeness of the questionnaire.

Ethical considerations

Written consent was obtained from the participants who agreed to participate in this study. Ethical approval was obtained from research and ethics committee of faculty of medicine university of Sana'a.

Statistical analysis

Data are presented as percentage and frequency distributions for categorical variables. simple logistic and backward stepwise multiple logistic were used to determine factors associated with hepatitis B

virus infection to obtain odd ratio(OR) and 95% confidence interval(CI). The data was analyzed by using statistical package for social science (SPSS) version with the significant level was at $p < 0.05$.

Result

A total of 500 questionnaires were returned to the researcher, 500 (100%) agreed to participate in this study. From table 1 showed that majority of blood donors were male (94.8%), married (66%) and coming from out of Sana'a (63.8) with family income >70 dollar per month (63%). However, most of participants attained secondary education level (45.2%), most of participants from hand workers (20%). Majority of them haven't history of: received blood transfusion (97.2%), previous surgery (90.6%), family jaundice (96.6%), dental treatment (89.6%), used shaving tool (87.4%), hemo-dialysis (99%), cupping (93.6%), HBV vaccination (89.8%) and malaria infected (93.8%) while majority of them have history of kat chewed (84.6%). Table 2 showed that from 500 participants 13 were positive for HBsAG with prevalence rate 2.6%. Also it showed that only three factor statistically significant (p value <0.05) in simple and multiple logistic regression. Participants who had history of dental treatment have 7.80 higher odds of having hepatitis B virus infected compared to those without history of dental treatment (a OR 7.80, 95% CI 2.26, 26.7). Those who had history of cupping have 7.254 higher odds of having hepatitis B virus infected compared to those without history of cupping (a OR 7.254, 95% CI 1.7, 30.8). Those who had history of malaria infected have 7.48 higher odds of having hepatitis B virus infected compared to those without history of malaria infected (a OR 7.48, 95% CI 1.75, 31.8). The rest of factors failed to achieve any statistical significant with prevalence of HBsAG.

Table (1) Socio -demographic Characteristics of blood donors and relevant history (n=500)

Factor	n(%)
Age (years)	
18-30	251 (50.2)
31-65	249 (49.8)
Sex	
Male	474 (94.8)
Female	26 (5.2)
Marital-status	
Married	330(66%)
Single	170(34%)
Residence	
Sana a	181 (36.2)
Other	319 (63.8)
Level of education	
Illiteracy	40 (8.0)
Primary school	201 (40.2)

Factor	n(%)
Secondary school	226 (45.2)
Post secondary school	33 (6.6)
Occupation	
Hand worker	100 (20.0)
Military	86 (17.2)
Driver	48 (9.6)
Student	46 (9.2)
Farmer	81 (16.2)
Housewife	9 (1.8)
Nurse	9 (1.8)
Other	9 (1.8)
Income	
1-70 dollar	177 (35.4)
>70 dollar	315 (63.0)

Table (1) Socio -demographic Characteristics of blood donors and relevant history (n=500)	
Factor	n(%)
Received blood transfusion	
No	486(9 7.2)
Yes	14 (2.8)
Number of received blood transfusion	
Once only	14 (2.8)
More than once	0 (0.0)
Previous surgery	
No	453 (90.6)
Yes	47 (9.4)
Family history of jaundice	
No	483(96.6)
Yes	17 (3.4)
Dental treatment	
No	448 (89.6)
Yes	52 (10.4)
Used shaving tool	
No	437 (87.4)
Yes	63 (12.6)
Type shaving tool	

Received blood transfusion	
Razor or other	62(12.4)
Nothing used	438(87.6)
Hemo-dialysis	
No	495 (99.0)
Yes	5 (1.0)
Cupping	
No	468 (93.6)
Yes	32 (6.4)
Vaccination	
No	449 (89.8)
Yes	51 (10.2)
Malaria	
No	469 (93.8)
Yes	31 (6.2)
Chewing kat	
No	77 (15.4)
Yes	423 (84.6)

Table(2) prevalence of hepatitis B and associated factors among blood donors according to socio - demographic characteristics and relevant history

Factor	HBV positive n (%)	HBV negative n(%)	Crude OR	95% CI	χ^2(df)	*p* value	Adj OR	95% CI	χ^2(df)	*p* value
Age										
18-35	6 (2.4)	245(97.6)	1							
36-65	7 (2.8)	242(97.2)	1.20	0.39 , 3.56	0.09(1)	0.800				
Sex										
Male	13(2.7)	461 (97.3)	1							
Female	0		0.00	0.00 ,0.00	1.40 (1)	0.200				
Marital-status										
Single	3 (1.8)	167 (98.2)	1							
Marred	10 (3.0)	320(97.0)	1.70	0.47 , 6.41	0.75(1)	0.400				

Factor	HBV positive n (%)	HBV negative n(%)	Crude OR	95% CI	χ^2(df)	*p* value	Adj OR	95% CI	χ^2(df)	*p* value
Residence										
Sana'a	5 (1.6)	314 (98.4)	1							
Other	8 (4.4)	173 (95.6)	0.30	0.11 , 1.00	3.50 (1)	0.060				
Education										
Illiteracy	2 (5)	38 (95)	2.10	046 , 10.05	0.80(1)	0.400				
Others	11(2.4)	449(97.6)	1							
Primary school	3(1.5)	198 (98.5)	0.40	0.12, 1.61	1.79 (1)	0.200				
Others	10(3.3)	289(96.7)	1							
Secondary school	7 (3.1)	219 (96.9)	1.40	0 .47 , 4.31	0.40 (1)	0.500				
Others	6(2.2)	268(97.8)	1							
Post-secondary	1 (3)	32 (97)	1.20	0 .15 , 9. 4 0	0. 03 (1)	0.900				
Others	12(2.6)	455(97.4)	1							
Occupation										
Hand worker	5 (5)	95(95)	2.50	0.83 , 8.06	2.40(1)	0.100				
Others	8(2)	392(98)	1							
Military	2 (2.3)	84 (97.7)	0.80	0.19 , 4.01	0.03 (1)	0.900				
Others	11(2.7)	403(97.3)	1							
Driver	2 (4.2)	46 (95.8)	1.70	0.38 , 8.11	0.45(1)	0.500				
Others	11(2.4)	441(97.6)	1							
Student	0(0.0)	46 (100)	0.0	0.00	2.500 (1)	0.100				
Others	13(2.9)	441(97.1)	1							
Farmer	0(0.0)	81 (100)	0.0	0.00	4.66(1)	0.100				
Others	13(3.1)	406(96.9)	1							
House wife	0(0.0)	9 (100)	0.09	0.00	0.479(1)	0.500				
Others	13(2.6)	478(97.4)	1							
Nurse	1 (11.1)	8 (88.9)	4.90	0.58 ,43.11	1.50(1)	0.200				
Others	12(2.4)	479(97.6)	1							

Factor	HBV positive n (%)	HBV negative n(%)	Crude OR	95% CI	χ^2(df)	*p* value	Adj OR	95% CI	χ^2(df)	*p* value
Other occupation	3 (2.5)	118 (97.5)	0.90	0.254 , 3.47	0.01 (1)	0.900				
Others	10(2.6)	369(97.4)	1							

ssTable (2) prevalence of hepatitis B and associated factors among blood donors according to socio -demographic characteristics and relevant history.

Factor	HBV positive n(%)	HBV negative n(%)	Crude OR	95% CI	χ^2(df)	*p* value	Adj OR	95% CI	χ^2(df)	*p* value
Income										
1-70 dollar	3(1.7)	174(98.3)	1							
>70 dollars	10(3.2)	305(96.8)	1.90	0.52 , 7.00	1.03 (1)	0.300				
Blood transfusion										
No	12 (2.5)	474 (97.5)	1							
Yes	1 (7.1)	13 (92.9)	3.00	0.37 , 25.14	.81 (1)	0.400				
Number blood transfusion										
Once or more	1 (7.1)	13(92.9)	3.00	0.36, 25.1	0.81 (1)	0.400				
No once	12(2.5)	474(97.5)	1							
Previous surgery										
No	12 (2.6)	441(97.4)	1							
Yes	1 (1.2)	46 (97.9)	0.80	0.10 , 6.28	0.05 (1)	0.800				
Family history with jaundice										
No	12 (2.5)	471 (97.5)	1							
Yes	1 (5.9)	16 (94.1)	2.50	0.30, 20.0	0.56 (1)	0. 500				
Dental treatment										
No	7 (1.6)	441 (98.4)	1							
Yes	6 (11.5)	46 (88.5)	8.20	2.65 , 25.5	14.50 (1)	0.001	7.80	2.26, 26.7	9.16 (1)	0.002

Shaving tool										
No	10 (2.3)	427 (97.7)	1							
Yes	3 (4.8)	60 (95.2)	2.10	0.57 , 7.90	1.10 (1)	0.300				
Type of shaving tool										
Nothing	10(2.3)	428(97.9)	1							
Razor or other	3(4.8)	59(95.2)	2.10	0.58 , 8.14	1.16 (1)	0.200				
Hemo-dailysis										
No	12 (2.4)	483 (97.6)	1							
Yes	1 (20)	4(80)	10.00	1.05 , 96.90	2.60 (1)	0.100				
Cupping										
No	9 (1.9)	459 (98.1)	1							
Yes	4 (12.5)	28 (87.5)	7.29	2.11 , 25. 13	7.49 (1)	0.006	7.254	1.7 , 30.8	5.09 (1)	0.010
Vaccination										
No	13 (2.9)	436 (97.1)	1							
Yes	0 (0.0)	51 (100.0)	0.0	0.0 , 0.0	1.50 (1)	0.200				
Malaria										
No	9 (1.9)	460 (98.1)	1							
Yes	4 (12.9)	27 (87.1)	7.57	2.1 9 , 26.17	7.70 (1)	0.005	7.48	1.75, 31.8	6.05 (1)	0.010
Chewed kat										
No	1 (1.3)	76 (98.7)	1							
Yes	12 (2.8)	411 (97.2)	2.20	0.28 , 17.32	0.72 (1)	0.4 00				

Discussion

The aim of the present study was to determine prevalence of hepatitis B and its associated factors specifically among blood donors in 48 Hospital. The Hospital where the blood donors were selected, located in Sana'a capital. Blood donors came from different regions of the governorates this reflected to some extent the prevalence of HBV in this community but more precisely reflecting the prevalence among healthy adult blood donors. The present study indicated that 2.6% of blood donors were positive HBsAG and this figure was higher compared to a study conducted in Yemen and among blood donors that showed a prevalence of 2.1% (14) and lower compared to a Study conducted in Yemen (4.2 %) (15). These differences in the prevalence rates might be explained by the geographical differences in the availability of services and vaccination of programs. When the finding of present study compares with similar studies in other countries and among blood donors, higher study reported from south Dar fur 6.25% (16), Tete Mozambique 10.6% (17), kano Nigeria 11.1% (18), Ibadan Nigeria 5.9% (19), Akure Nigeria 7.4% (20), Quảng Trị, Vietnam 11.1% (21). Lower finding was also reported from Kathmandu Nepal 0.47% (22), 1% in Jordan (23), 0.5% in Iraq (24) Gujarat India 0.68%, (25), Different geographical location, socio-cultural difference, hepatitis B vaccination, dominant genotype, sub genotype and mutant existence may be possible factors.

Results from the present study showed that age, gender, marital-status, residence area, occupation and previous surgery was not significantly associated with hepatitis B virus infection. This finding is supported by many studies conducted in Yemen (26) and other countries such as Ethiopia (27) and India (28) that showed that these factors were not significantly associated with hepatitis B virus infection. The difference between males and females could not be evaluated because all subjects were male. However, average monthly income not significant in present study, it was significant association in other countries such as Ethiopia. This is because monthly income in Yemen is low due to ware. However, previous studies in Yemen showed that blood transfusion was significant association to hepatitis B virus infected (29) , present study it is not significantly associated with Hepatitis B virus infected, this is because training of blood bank staff and nursing staff on preventive and screening measures during blood transfusion .in addition, other studies conducted in other countries showed that blood transfusion was not significantly associated with hepatitis B virus infected such as Ethiopia (30) and India (31). Results from the present study showed that family jaundice was not significantly associated with hepatitis B virus infected. This result similar study conducted in India (31).

Results from the present study showed that dental treatment and cupping were significant associated with Hepatitis B virus infected. This results consistent with findings of previous study conducted in Yemen (32) while dental treatment was similar to study conducted in Saudi Arabia in Jazan region (33) and cupping was similar to study conducted in Iran (34). Compared among study participants grouped based on history of: dental treatment, cupping, participants who had history of: dental treatment,

cupping were more likely to have infection than participants without history of dental treatment and cupping (a OR 7.80, 95% CI 2.26, 26.7, a OR 7.254, 95% CI 1.7, 30.8 respectively). This may indicate that no application of infection control procedures in dental clinics and cupping centers. Results from present study showed that previous infection with malaria was significantly associated with HBV, this finding is similar to study conducted in Yemen (35) and other study conducted in Vietnam (36). Previous studies in Yemen have shown that the prevalence rates of malaria ranged between 12.8% and 18.6% (37), (38). may be because of co infection in endemic areas. Compared among study participants grouped based on history of malaria infection, participants who had history of malaria infection were more likely to have infection than participants without history of malaria infection (a OR 7.48, 95% CI 1.75, 31.8).

Results from present study showed that used shaving tool and its type were not significantly associated with Hepatitis B virus infected, this finding is similar to study conducted in Yemen (39) and in Ethiopia (40). This may be because increased of awareness among blood donors about avoid used of shaving tool. However, Hemo-dailysis was significant association with prevalence of Hepatitis B virus infected in other study conducted in Yemen (41) and in Libya (42), but in our study it was not significantly associated with prevalence of Hepatitis B virus infected may be because of awareness among health workers who work in renal dialysis departments in Hospitals and application of good sterile procedures. Hepatitis B vaccination in our study was not significantly associated with prevalence of Hepatitis B virus infected this result is similar to other study conducted in Brazilian city (43). This meaning that vaccination is a protective factor against Hepatitis B virus. Kat chewing in our study was not significantly associated with prevalence of Hepatitis B virus infected this result similar to other study conducted in Yemen (44). Future researchers should look into other factors that may contribute to exposure to Hepatitis B virus infected such as blood groups.

Conclusion

This study showed that the prevalence of Hepatitis B virus infections among blood donors in 48 Hospital and the prevalence was 2.6%. dental treatment, cupping and malaria infected were related to Hepatitis B virus infection. We recommend ministry of health with monitoring and application of infection control procedures in dental clinics, cupping centers and application of malaria control programs in endemic areas. In additional, increased coverage of hepatitis B vaccination would further reduce prevalence of hepatitis B.

Acknowledgement

We would like to thank for my parents. I wish to acknowledge the financial support and approval obtained from medical research committee in Sana'a university.

References

1. Lavanya V, Viswanthan T, Arul SS, Malarvizhi A, Morthy. Prevalence of hepatitis B virus infection among blood donors with antibodies to hepatitis B core antigen. *Int J Med Sci*,2012;4(6):128-137.
2. World Health Organization 2015. Hepatitis B Available from: http://www whoint/mediacentre/factsheets/fs204/en.
3. 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; 32:1046–50.
4. Samadi M, Ghasemzade AH, Sarizade G, Ebrahimi S, Saati S, Abassinejad- Pour A, et al. The comparison of the prevalence rates of HBV, HCV, and HIV in blood donors having deferred for high risk behaviors. *Sci J Iran Blood Tran*s Org,2014;10.(4)
5. 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):912-916.
6. Wasfi OAS, Sadek NA. Prevalence of hepatitis B surface antigen and hepatitis C virus antibodies among blood donors in Alexandria, *EMHJ* ,2011; March;17(3):238-42.
7. Rashed AA, Selim AK, Walid A, Jowana S. Epidemiology of hepatitis B and hepatitis C in Lebanon. *Arab Journal of Gastroenterology*,2016 ;17(1):29-33.
8. Babanejad M, Izadi N, Najafi F, Alavian S M. The HBsAG prevalence among blood donors from Eastern Mediterranean and Middle Eastern countries: A systematic review and meta- analysis,2016;16(3): e3566.
9. AL-Waleedi AA, Khader YS. Prevalence of hepatitis B and C infections and associated factors among blood donors in Aden city, *Yemen. EMHJ* 2012;18(6):624-629.
10. Zampino R, Boemio A, Sagnelli C, Alessio L, Adinolfi LE, Sangnelli E, Coppola N. Hepatitis B virus burden in developing countries. World journal of gasteroenterology,2015; 21(42):11941-11953.
11. Shepard CW, Simard EP, Finelli L, Fiore AE, Bell BP. Epidemiology of Hepatitis B Virus Infection Epidemiol Rev 2006; 28:112-125.
12. Salem AK, Abdurab A, Alfakh Y, Aown A. Hepatocellular carcinoma in Yemeni patients: a single center experience over an 8-year period. *East mediterr Health Journal* 2012; 18(7):693-699.
13. Kish, L. Survey sampling New York, Johan wily, Sons;272.
14. 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. *Yemen JMS* 2016;6.
15. Salam TA, Raja'a YR, Bahaj S, Al-Shami AM, LU M, Roggendrof M, Tong CYW. Hepatitis B virus carrier rate, prevalence and impact of immunization program among household in the city of Taiz. *journal homepage*:ww.elsevier.com/locate, vaccine 2012; 30(37),5564-5568.

16. Abou MA, Eltahir YM, Ali AS. Seroprevalence of Hepatitis B virus and Hepatitis C virus among blood donors in Nyala, South Dar Fur, Sudan. *J Virol* 2009; 6:146.
17. Stokx J, Gillet P, De Weggheleire A, Casas EC, Maendaenda R, Beulane AJ, Jani IV, Kidane S, Mosse CD, Jacobs J, Bottieau E. Seroprevalence of transfusion transmissible infections and evaluation of the pre-donation screening performance at the provincial Hospital of Tete. Mozambique BMC Infect Dis 2011; 11(141):1-8.
18. Nwankwo E, Momodu I, Umar I, Musa B, Adeleke S. Seroprevalence of major blood-borne infections among blood donors Kano, Nigeria. Turk J Med Sci 2012; 42(2):337-341.
19. Afolabi AY, Abraham A, Oladipo EK, Adefolarin AO, Fagbami AH. Transfusion transmissible viral infections among potential blood donors Ibadan, Nigeria. *Afr J CLN Exp Microbia*l 2013;14(2):84-87.
20. Shittu MO, Adekola SA, Ajao KO, Adeniji TW, Awe CO. Seroprevalence of Hepatitis B Surface Antigenemia and Hepatitis C Virus among Intending Blood Donors at Mother and Child Hospital, Akure, Nigeria. *Int J Med Sci* 2014; 47(2):1554-1557.
21. Viet L, Lan NTN, Ty PX, Bjorkvoll B, Hoel H, Tore Gutteberg T, et.al. Prevalence of hepatitis B and hepatitis C virus infections in potential blood donors in rural Vietnam. *Indian J Med Res* 2012; 136:74-81.
22. Shrestha AC, Ghimre P, Tiwari BR, Rajkarnikar M.Transfusion –transmissible infections among blood donors in Kathmandu. *J Infect Dev Ctries* 2009;3(10):794-797.
23. 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):912-916.
24. AL-Juboury AWF, Salih HALM, AL-Assadi MK, Ali AM. Seroprevalence of Hepatitis B and C among Blood Donors in Babylon Governorate- Iraq. *Med J Babylon* 2010; 7(1-2):1-9.
25. Dhruva GA, Agravat AM, Dalsania JD, Katara AA, Dave RG. Transfusion Transmitted Diseases \Infections among Blood donors in a Tertiary Care Hospital at Rajkot, Gujrat India. *Int Res J Med Sci* 2014;2(4):16-19.
26. AL-Waleedi AA, Khader YS. Prevalence of hepatitis B and C infections and associated factors among blood donors in Aden city, Yemen. *EMHJ* 2012;18(6):624-629.
27. Kabato AA,Weldearegay GM. Prevalence and associated risk factors of Hepatitis B and Hepatitis C virus among volunteer blood donors in Arba Minch Blood Bank SNNPR, Ethiopia. *Journal of Medical laboratory and Diagnosis* 2016; 7(4):20-27. 16
28. Lavanya V, Viswanthan T, Arul SS, Malarvizhi A, Morthy. Prevalence of hepatitis B virus infection among blood donors with antibodies to hepatitis B core antigen. *Int J Med Sci* 2012;4(6):128-137.
29. Al-Hegam M,Al-Mamari A, Alkadasse A.Prevalence of hepatitis b and hepatitis c virus infections among patients with chronic renal failure in Zabeed city, Yemen republic. *open J med microbial* 2015; 5, 136.

30. Kabato AA,Weldearegay GM. Prevalence and associated risk factors of Hepatitis B and Hepatitis C virus among volunteer blood donors in Arba Minch Blood Bank SNNPR, Ethiopia. *Journal of Medical laboratory and Diagnosis* 2016; 7(4):20-27.
31. Lavanya V, Viswanthan T, Arul SS, Malarvizhi A, Morthy. Prevalence of hepatitis B virus infection among blood donors with antibodies to hepatitis B core antigen. *Int J Med Sci* 2012;4(6):128-137.
32. AL-Waleedi AA, Khader YS. Prevalence of hepatitis B and C infections and associated factors among blood donors in Aden city, Yemen. *EMHJ* 2012;18(6):624-629.
33. Ageely H, Mahfouz MS, Gaffar A, Elmakki E, Elhassan I, Yasin AO, Bani I. Prevalence and risk factors of Hepatitis B Virus in Jazan Region, Saudi Arabia: Cross-sectional Health facility based study. http://dx.doi.org/10.4236/health.2015.74054.
34. Ziaee M, Azarkar G. Prevalence of Hepatitis D Virus Infection Among Patients with Chronic Hepatitis B Attending Birjand Hepatitis Clinic (East of Iran) in 2012. *International Monthly Journal in the field of Hepatology* 2013; .13(8): e11168.
35. AL-Waleedi AA, Khader YS. Prevalence of hepatitis B and C infections and associated factors among blood donors in Aden city, Yemen. *EMHJ* 2012;18(6):624-629.
36. Bruno B, Andrade, Cristiane J N,Santos, Luis M, Camargo, Sebastiao M, Souza-Neto, Antonio Reis-filho, Jorge C, Vitor R R, Mendonca, Nivea F, Luz, Erney P, Camargo, Aldina Barral, Antonio A M, Silva, Manoel Barral-Netto. Hepatitis B Infection Is Associated with Asymptomatic Malaria in the Brazilian Amazon. http://dx.doi.org/10.1371/*journal.pone* 2011;0019841.
37. Alkadi HO, Al-Maktari MT, Nooman MA. Chloroquine-resistant Plasmodium Falciparum local strain in Taiz Governorate Republic of Yemen. Chemotherapy, 2006,52:166-170.
38. Al-Maktari MT et al. Malaria status in Al-Hodeidah Governorate, Yemen: malariometric parasitic survey and chloroquine resistance P. Falciparum local strain. *Journal of society of parasitology* 2003,33:361-372.
39. Mansoobl AS, Salem AK,Selwi AH,Assamawi A. Rask factors of hepatitis b and c viruses among patients admitted in surgical departments at Al-Thawra Hospital, Sana'a, Yemen. *Sudan med J* 2013;49(3):168-175.
40. Kabato AA,Weldearegay GM. Prevalence and associated risk factors of Hepatitis B and Hepatitis C virus among volunteer blood donors in Araba Minch Blood Bank SNNPR, Ethiopia. *Journal of Medical laboratory and Diagnosis* 2016; 7(4):20-27.
41. Al-Nabehi BAH,Al-shamahy H,Saeed W,Musa AM,EL-Hassan AM,Khalil EAG. Sero-molecular epidemiology and risk factors of viral hepatitis in urban Yemen. Int Jof virology 2015;11(3),133-8.
42. Alashek WA, Mclntyre CW, Taal MW .Hepatitis B and C infection in haemodialysis patients in Libya: prevalence, incidence and risk factors. National library of medicine, National Institutes of Health, BMC Infect Dis 2012; 12:265. doi: 10.1186/1471-2334-12-265.

43. De Paula Machado DF, Martins T, Trevisol DJ, Silva RA, Narciso-Schiavan JL, Trevisol FS, De lucca Schiavan. Prevalence and factors Associated with Hepatitis B Virus infection among senior citizens in a Southern Brazilian city. Hepatitis Monthly 2013;13(5): e7874.
44. Salem AK, Abdurab A, Alfakh Y, Aown A. Hepatocellular carcinoma in Yemeni patients: asingle centre experience over an 8-year period. East mediterr Health Journal 2012; 18(7):693-699.13. Kish, L. Survey sampling New York, Johan wily, Sons;272.