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RESEARCH ARTICLE

PREVALENCE OF HEPATITIS G VIRUS AMONG PATIENTS WITH CHRONIC LIVER DISEASE AND HEALTHY INDIVIDUALS, SANA'A CITY-YEMEN

Esmail Mohammed Saad Al-Dabis, Hassan A. Al-Shamahy, Maria Mansour Saeed Al-Hadad, Emad Hassan Al-Shamahi
Medical Microbiology and Clin. Immunology, Faculty of Medicine and Health Sciences, Sana'a University, Republic of Yemen.

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***Address for Correspondence:**
Dr. Hassan A. Al-Shamahy, Faculty of Medicine and Heath Sciences, Sana'a University, P.O. Box 775 Sana'a, Yemen. Phone: +967-770299847, E-mail: *shmahe@yemen.net.ye*

Abstract

Objective: Hepatitis G virus (HGV) is a newly discovered and enveloped RNA positive-stranded flavivirus-like particle, which has not yet been proven to have major negative effects on liver. Therefore, it is important to estimate the prevalence and risk factors of hepatitis G virus infection in Yemeni viral hepatitis patients and general population to design standard prevention and treatment plans.
Methods: Screening HGV antibodies among 60 chronic HBV and 144 chronic HCV patients comparing with its prevalence in 218 healthy controls were carried out. Serum samples were collected and tested for human HGV IgG by commercially available ELISA technique. Demographic data such as gender, age, and risk factors of contracting HGV virus were recorded in predesigned questionnaire.
Results: The crude prevalence rate of HGV was 2.8%, female specific rate was 0% and male specific rate was 3.5%. The prevalence of HGV among HBV patients was 0%; HCV was 1.4% while in healthy individuals it was 4.6%. When age groups considered, the prevalence of HGV among age groups 20-29 years and 30-39 years was 3.5%, while in older age groups the rate of HGV was 0%. There was a trend towards increased levels of HGV infection with the second and third decades of life (3.5%). There was no significant association between HGV infection and risk factors of hepatitis viruses.
Conclusion: It can be concluded from this study that HGV virus is circulating in the risk groups and in the community in general Yemen, and there is a possibility that this virus may at some time become epidemic if preventive measures are not applied. The risk of community among healthy people more than in risk groups as HBV and HCV patients. Additionally HGV increases with young male adults.
Keywords: Hepatitis G virus (HGV), HBV, HCV, Prevalence, Sana'a city-Yemen.

INTRODUCTION

From 1995 to 1996, two independent laboratories in the USA isolated a new enveloped RNA virus similar to flavi viruses. The first laboratory named it GB virus C/GBV-C and the second as hepatitis G virus (HGV)[1]. HGV is a virus in the flaviviridae family and known to be infectious for human, but it has not been established to cause human disease with certainly[2]. However, there is a suspicious link between HGV infection and acute or fulminant hepatitis, chronic hepatitis and hepatic fibrosis[3,4]. High prevalence is observed among subjects with risk of parenteral exposure including those with exposure to blood and blood products[5]. Approximately, 2% of healthy United States blood donors had viremia with HGV and up to 13% of blood donors had antibodies against E2 protein, indicating a possible prior infection[6]. Sexual contact and vertical transmission could be another route of HGV transmission[6]. Furthermore, HCV and HBV infected patients have evidence of higher rate of HGV infection[7,8].

However, none of the studies indicated that HGV infection can cause any liver enzyme elevation or hepatic failure certainly, but co-infection with other hepatitis viremia can increase morbidity and mortality rates[9]. HGV prevalence rate among healthy and the role of this agent in acute and chronic liver disease in Yemen is absent or at least poorly understood, so this study was carried out as one of the first study to detected the prevalence rate of HGV/GBV-C among HBV and HCV infected patients comparing with healthy controls, and risk factors of transmission HGV/GBV-C and the co-infection with HBV and HCV in Yemen.

SUBJECTS AND METHODS

This study was carried out during a period of nine months, starting in March 2015 and ending in November 2015. A total of 422 individuals were included; 218 healthy controls, 60 of chronic HBV patients and 144 chronic HCV patients attended to the main general hospitals in the Sana'a city. Serum samples were collected and tested for human HGV IgG by commercially available ELISA technique (Roche). A full history was taken from each studied individual; and the findings were recorded in a predesigned questionnaire. The data collected included name, age at the time of the study, sex, marital status, residence, date, clinical and diagnostic data, risk factors and laboratory results.

Statistical Analysis

To relate possible risk factors for HGV infection, the data were examined in a case-control study format. For HGV, persons with evidence of previous or current infection with HGV (antibodies-positive) were matched up with those who were HGV antibodies negative.

Ethical Consideration

Ethical clearance for the study was taken from the Faculty of Medicine and Health Sciences Research Review Committee. Informed Consent was taken from the volunteers before the collecting specimens.

RESULTS

The crude prevalence rate of HGV was 2.8%, female specific rate was 0% and male specific rate was 3.5%. The prevalence of HGV among HBV patients was 0%; HCV was 1.4% while in healthy individuals it was 4.6%. When age groups considered, the prevalence of HGV among age groups 20-29 years and 30-39 years was 3.5%, while in older age groups the rate of HGV was 0%.

Table 1: The prevalence rate and association odds ratio of HGV among HBV, HCV patients and healthy controls.

Characters	Anti-E2 positive (HGV positive)		OR	CI	χ^2	P
	No	%				
HBV chronic patients, n=60	0	0	0	0.0-2.6	2.1	0.15
HCV chronic patients, n= 144	2	1.4	0.36	0.05-1.8	1.8	0.17
Healthy controls, n=218	10	4.6	4.8	1.04-32.5	5	0.02
Total n=422	12	2.8				

OR Odds ratio = RR (relative risk) =› 1at risk, CI-Confidence intervals, χ^2-Chi-square =≥ 3.84 (significant), *p*-Probability value =‹ 0.05 (significant)

Table 2: The prevalence rate and associated odds ratio of HGV among different sexes and age groups among total patients and controls.

Sex and age groups	Anti-E2 positive (HGV positive)		OR	CI	χ^2	P
	No	%				
Sex						
Male, n=342	12	3.5	undefined		422	<0.001
Female, n= 80	0	0	0.0	0.0-1.8	2.9	0.08
Age groups						
20-29 years, N=170	6	3.5	1.44	0.4-5.14	0.39	0.53
30 – 39 years, N= 114	4	3.5	1.4	0.34-5.12	0.25	0.61
40 – 49 years, N= 60	0	0	0.0	0.0-2.6	2.1	0.15
50 – 59 years, N= 50	0	0	0.0	0.0-3.2	1.7	0.19
>59 years n=28	2	7.1	2.95	0.0-15.5	2.01	0.15

OR Odds ratio = RR (relative risk) =› 1at risk, CI-Confidence intervals, χ^2-Chi-square =≥ 3.84 (significant), *p*-Probability value =‹ 0.05 (significant)

Risk Factors to HGV: From the study participants 8.7% reported that they had direct contact with hepatitis patients, 3.1% had sexual contact with HBV or HCV patients, 8.3% had household with HBV or HCV patients, 47.4% had history of dental visit, 68.2 sharing blades and scissors, 10.2% had blood transfusion, 16.6% had cupping and 33% had history of surgery (Table 3).

Associated Odds ratio of HGV: There were significant risk factors of HGV with males in which the rate was 3.5%, while in female the rate was 0% (p<0.001). In respect of age groups, there were no significant risk factors of HGV (Table 2). In respect of risk factors, there were no significant risk factors of HGV with usual risk factors of hepatitis G virus (Table 4).

DISCUSSION

The present study represents the first investigation of HGV infection in patients with chronic hepatitis B and HCV living in Sana'a city, Yemen. HGV was detected

by ELISA in 12 (2.8%) of all patients and healthy controls. The rate of HGV was 0% for HBV-infected patients, 1.4% for HCV-infected patients and 4.6% for healthy controls. The values related to co-infection of HGV with HCV and HBV in current study were lower from that reported by Amini *et al.*, Ghanbari *et al.*, and Zali *et al.*, in Iran in which the rate of HGV with HBV was varying between 5% and 43%[10,11,12]. Also, Yang *et al.*, in Taiwan showed that co-infections of HGV with HBV and HCV were 18% and 55%, respectively[13], Tanaka *et al.*, 1998 in Japan showed that co-infection of HGV with HCV was 10.9%[14], in Thailand Barusruk and Urwijitaroon *et al.*, 2006 showed that co-infection with HCV was 10%[15], and in Egypt HGV with HCV was 64.9%[16]. Additionally, in some studies, co-infection of HGV with HCV and HBV was reported with lower values than that of Iran and Taiwan. Alvarado-Mora *et al.*, in Colombia reported that 5.06% of HBs Ag-positive samples were also HGV-positive, while 3.2% of HCV positive cases were HGV-positive[17], which in the case of HBV samples is higher to current findings but much slightly higher than the co-infection rate of HGV and HCV in the present study (1.4%). There is a large variation and difference in the prevalence of HGV infection in different geographical regions. This difference may be due to the volume of the population involved in the study, methodology used to detect HGV infection, demographic and clinical features of patients, and different patterns of transmission of virus around the world (blood and blood components, sexual routes, intravenous injection, etc[18].

Table 3: The risk factors to HGV in tested hepatitis patients and healthy controls at Sana'a city.

Risk factors	Yes		No	
	No	%	No	%
Direct contact with hepatitis patients	37	8.7	385	63
Sexual contact: with HBV, HCV	13	3.1	409	87
Household with HBV, HCV	35	8.3	387	91.7
Abroad travel	42	10	380	90
History dental visit	200	47.4	222	52.6
History sharing blades, scissors	288	68.2	134	31.8
Blood transfusion	43	10.2	279	89.8
History parental exposure	3	0.71	419	99.29
History of cupping	70	16.6	352	83.4
History of surgery	97	33	325	77

Table 4: The potential risk factors of HGV infection in total patients and controls groups.

Risk factors	Anti-E2 positive (HGV positive)		OR	CI	χ^2	P
	No	%				
Direct contact with hepatitis patients, n=37	0	0	0.0	0.0-4.5	1.19	0.27
Sexual contact: with HBV, HCV (n=13)	0	0	0.0	0.0-14.7	0.39	0.53
Household with HBV, HCV (n=35)	0	0	0.0	0.0-4.8	1.12	0.29
Abroad travel: (n=42)	0	0	0.0	0.0-3.93	1.37	0.24
History dental visit: (n=200)	4	2	0.55	0.14-2	0.98	0.32
History repeated use of needles: (n=0)	0	0	undefined			
History sharing blades, scissors (n=288)	6	2.1	0.4	0.12-1.5	2.3	0.12
Blood hemodialysis (n=0)	0	0	undefined			
Blood transfusion (n=43)	1	2.3	0.77	0.1-5.9	0.06	0.8
History parental exposure (n=3)	0	0	0.0	0.0-86	0.09	0.76
History patient receive a tattoo: (n=0)	0	0	undefined			
History of cupping: (n=70)	2	2.9	0.98	0.2-4.3	0.00	0.97
History of surgery: (n=97)	2	2.1	0.6	0.1-3.19	0.32	0.56

OR Odds ratio = RR (relative risk) =› 1at risk, CI-Confidence intervals, χ^2-Chi-square =≥ 3.84 (significant), *p*-Probability value =‹ 0.05 (significant)

However, the present study represents the first investigation of HGV infection in healthy controls in Yemen. The HGV prevalence rate in the present study among healthy controls was 4.6%, higher than that in hepatitis patients (0% with HBV, and 1.4% with HCV). The rate among healthy individuals is lower than that reported from Africa[19] (33%), US[20] (13%), and the 33% of China[21]. Thus HGV infection prevalence in Yemeni healthy people (4.8%) could be regarded as a low level. Since in the present study 218 healthy individuals were enrolled and selected randomly, the calculated prevalence data for hepatitis G in them are reliable. However, in general, all results published showed that hepatitis G infection was uncommon in

healthy individuals, and this was also confirmed by current study. The specific female prevalence of HGV was 0% among both patients and healthy control females, while male prevalence was 3.5 %. Current study result was different to the sex distribution of HGV/GBV-C infection in western countries where equal distribution is the feature in all reports[22,23]. In addition; the present study showed that there was trend toward increased levels of HGV/GBV-C infection with the second, and the third decades of life where the rates were 3.5%, with OR=1.4, and 7.1% with OR=2.95 respectively. This similar to findings in prospective study of 2796 hemodialysis patients seen in Germany[24] which reported that higher prevalence of HGV/GBV-C were in the 3rd decades of life among hemodialysis patients. The increasing of prevalence rate with increasing age in current study could indicate an accumulation risk of infection over time. There was no significant association between HGV/GBV-C infection and history of all parenteral transmission routes (Table 4), and this opposite to the findings by Fogeda *et al.*,[25] and Basaras *et al.*,[26] that prior factors were risk factors for HGV/GBV-C in Spain and Germany.

CONCLUSION

It can be concluded from this study that HGV virus is circulating in the risk groups and in the community in Sana'a city, and there is a possibility that this virus may at some time become epidemic if preventive measures are not applied. The risk of exposure to HGV increases with advancing age, and no significant risks of contracting HGV through parenteral transmission.

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AUTHOR'S CONTRIBUTION

This research work is part of A MSc. thesis. **Al-Dabis EMS:** conducted the laboratory and field works; and wrote up the thesis. **Al-Shamahy HA:** supervised the laboratory and field works, revised and edited the thesis draft and the manuscript. **Al-Hadad MMS:** helped in conducted the field works. **Al-Shamahi EH:** field works. All authors revised the article and approved the final version.

DATA AVAILABILITY

The data and material are available from the corresponding author on reasonable request.

CONFLICT OF INTEREST

None to declare.

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