Retrospective Seroprevalence Study of Hepatitis B and C in Iraqi Population at Baghdad: A Hospital Based Study

Arwa H. Al –Hamdani * **MBChB, MSc, PhD**

Sarab K. Al-Rawy** **BSc, MSc, PhD**

Hind A. Khamees** **BSc, MSc**

Background: In the recent times, viral hepatic infections (HBV and HCV) have become common and the most important cause of liver disease. It is posing a great health problem especially in the developing world.

Objective: to investigate the prevalence of HBV and HCV during five non consecutive years 2003,2004,2006,2008 and 2009.

Material and Methods: the virology laboratory records from Al-Yermouk Teaching Hospital in Baghdad over 5 years were reviewed, retrospectively, for the prevalence and yearly trends of HBV and HCV seropositivity. A total of 15581 HBV & 11722 HCV patients with liver complaints and apparently healthy individuals were examined and studied for their relation to some risk factors like age, gender and seasonal variation. . Enzyme Linked Immunosorbent Assay (ELISA) for hepatitis B surface antigen (HBsAg) and hepatitis C virus antibody (HCVAb) were performed in the study population.

Results: It was found that positive HBV among patients with liver complaints and apparently healthy individuals were peaked during year 2004 at a rate of 5.5% and 6.1% respectively. Moreover, results showed that the HBV seropositivity rate in patients with liver complaints was significantly higher in females compared to males (5.7% vs. 3.5%). The higher HBV seroprevalence was found in age groups <1 year and age ≥40 years, It was found that HCV positive cases among patients with liver complaints were peaked during 2006(8.6%) ,while apparently healthy individuals peaked during 2003 (7.2%) . HCV positivity rate in patients and apparently healthy individuals was significantly higher in males compared to females (5.4% vs. 2.3%) and (4%vs.1.3%) respectively. Regarding the age distribution of anti-HCV the higher prevalence age was ≥ 30 years significantly. Finally, there is no association between HBV and HCV seropositivity rates and the season.

Conclusion: The study raises serious concerns regarding the HBV and HCV which were found to be intermediate to highly endemic infections in our country. Although HBV and HCV showed increasing trends during study period, it was fortunately decreasing in 2008, 2009 to certain limits.

Key words: Hepatitis B (HBV), Hepatitis C (HCV), Seroprevalence, Retrospective, Iraq

Introduction:

Viral hepatitis is one of the serious health problems in the world .Hepatitis B and C viruses (HBV and HCV) are the most common viral infections worldwide leading to high rates of morbidity and mortality in the developing countries [(2)], HBV as well as HCV are a major cause of chronic Hepatitis [(3)].

The presence of hepatitis B virus surface antigen (HBsAg) signifies infection with HBV. The presence of HBsAg is also diagnostic of carrier[(4,5)].Based on the prevalence of HBV chronic carriers (individuals positive for hepatitis B surface antigen, HBsAg) amongst adults in the general population, countries are classified as having low endemicity (< 2%), intermediate endemicity (2%–5%), or high endemicity (> 5%) of infection [(6)]. Few studies to investigate the prevalence of HBV and HCV in Iraq have shown different prevalence rates. Studies in the Middle East show the prevalence of HBsAg in Iraq is from 4% to 5% in years 1995[(7)] and 1997[(8)] respectively. Moreover another study concluded that HBsAg prevalence among Iraqi blood donors was found to be 2.48% at Baghdad in year 2000 [(9)]. However, Iraq was found to have high endemicity in years 2000[(10)] and 2010[(11)].Moreover, the prevalence of HCV infection was much lower than HBV infection among blood donors; anti-HCV rate was found to be 1.2% in Baghdad in year 2000[(9)], however, other study was showing much higher probable prevalence of HCV amongst population than hepatitis B[(11)].The aim of this study is to investigate the prevalence and trends of HBsAg, HCV positivity in patients and apparently healthy individuals over a period of five non-consecutive years and their relation to some risk factors like age, gender and seasonal variation.

Materials and Methods:

Individuals in the years 2003,2004,2006,2008 and those in 2009 were included in study. The study was performed at Al-Yermouk Teaching Hospital, College of Medicine, and Al-Mustansiriya University in Baghdad.

The major end points were to determine the prevalence and trends of HBsAg, anti-HCV in patients with liver complaints and healthy population in this area of Iraq.

The calculation of the prevalence of HBsAg, anti-HCV was retrospectively done by investigating the records of patients with liver complaints and apparently healthy individuals (those investigated to fulfill requirements of work applicants) within this period. A total of 15581 patients and healthy individuals were examined for HBV (with male to female ratio 50.7% vs.49.3%) and 11722 for HCV (with male to female ratio 48.8% vs.51.2%). Prevalence of HBsAg, anti-HCV were investigated according to gender, age. Testing for HBsAg and anti-HCV was done by using commercially available

ELISA system (bioelisa HBsAg 3.0, bioelisa HCV 4.0 BIOKIT S.A. Spain).The same generation ELISA test kits were used during the five years.

All the methods and techniques strictly followed the manufacturer's recommendations and were done in the Virology Department in Al-Yermouk Teaching Hospital in Baghdad, Iraq.

Statistical analysis was performed using the SPSS, version 10.1, software package (SPSS, Inc., Chicago, IL). Statistical analysis was also performed using $\chi 2$ for categorical variables. *P* values less than 0.05 were considered statistically significant.

Results:

A total of 15581 patients: 9615 with liver complaints and 5966 apparently healthy individuals were examined for HBV (HBsAg) positivity throughout the study period (2003, 2004, 2006, 2008 and 2009).

In addition, a total of 11722: 7560 patients with liver complaints and 4162 apparently healthy individuals were examined for HCV (anti-HCV) positivity throughout the same period. HBsAg and anti-HCV seropositivity rates vary over the years.

Table (1) and (2); represent the yearly distribution of HBV seropositive cases among patients with liver complaints and apparently healthy individuals respectively throughout the study period (5 years).

It was found that HBV positive among patients and apparently healthy individuals were peaked during year 2004 at a rate of 5.5% and 6.1% respectively.

Regarding the gender, the results showed that the HBV seropositivity rate in patients with liver complaints was significantly higher (p=0.0001) in females compared to males (5.7%vs.3.5%).

However, statistical analysis showed that there is no association between HBV seropositivity and gender among apparently healthy individuals.

The distribution of HBV cases according to the age and sex were presented in Table (3).The HBV positive cases were significantly higher among males age groups<1year, 40- 60 years, however ≥ 40-49 and ≥60years among females.

Table (4) and (5) represent the yearly distribution of HCV positive cases among patients with liver complaints and apparently healthy individuals respectively throughout the study period.

It was found that HCV positive cases among patients with liver complaints were peaked significantly during year 2006(8.6%) while, in apparently healthy individuals were peaked during year 2003(7.2%) also significantly.

Regarding the gender, the results showed that the HCV positivity rate in patients with liver complaints and apparently healthy individuals was significantly higher (p= 0.0001) in males compared to females (5.4% vs. 2.3%) and (4% vs.1.3%) respectively. The distribution of HCV cases according to age and sex were presented in Table (6).The HCV positive cases were significantly higher among males with age groups ≥ 30-59 years (p=0.0001) and with age groups ≥ 60 years (p=0.0001) among females results.

Finally, statistical analysis showed that there is no association between HBV and HCV seropositivity rates and the season (cold or hot).

Table 1: Trend of the prevalence of hepatitis B in patients with liver complaints /year.

Year	Total	Hepatitis B	
		No	%
2003	1197	61	5.1
2004	1623	90	5.5
2006	1192	58	4.9
2008	1747	68	3.9
2009	3856	163	4.2

P=0.116 (Not significant)

Table 2: Tend in prevalence of hepatitis B in apparently healthy individuals per year.

Year	Total	Hepatitis B	
		No	%
2003	550	22	4.0
2004	1055	64	6.1
2006	761	37	4.9
2008	1172	29	2.5
2009	2428	84	3.5

P=0.0002 (Highly significant)

Table (4): Trend in prevalence of hepatitis C in patients with liver complaints per year.

Year	Total	Hepatitis C	
		No	%
2003	800	25	3.1
2004	1316	53	4.0
2006	700	60	8.6
2008	1366	52	3.8
2009	3378	101	3.0

P=0.0001 (Highly significant)

Table (5): Trend in prevalence of hepatitis C in apparently healthy individuals.

Year	Total	Hepatitis C	
		No	%
2003	**153**	**11**	**7.2**
2004	**767**	**13**	**1.7**
2006	**419**	**20**	**4.8**
2008	**867**	**19**	**2.2**
2009	**1956**	**46**	**2.4**

P=0.0001 (Highly significant)

Table (3): The age and sex distribution of HBsAg.

Age group (years)	Male			Female			Total		
	Total examined	HBsAg positive		Total examined	HBsAg positive		Total examined	HBsAg positive	
		No	%		No	%		No	%
<1	18	7	38.9	19	-	-	37	7	18.9
1—9	413	13	3.1	308	3	1.0	721	16	2.2
10—19	661	23	3.5	510	10	2.0	1171	33	2.8
20—29	1058	47	4.4	1064	32	3.0	2122	79	3.7
30—39	737	43	5.8	900	38	4.2	1637	81	4.9
40—49	598	60	10.0	759	50	6.6	1357	110	8.1
50—59	454	47	10.4	438	19	4.3	892	66	7.4
=>60	297	21	7.1	172	10	5.8	469	31	6.6
P value	0.0001 (Highly significant)			0.0001 (Highly significant)			0.0001 (Highly significant)		

Table (6): The age and sex distribution of Anti-HCV.

Age group (years)	Male			Female			Total		
	Total examined	Anti-HCV positive		Total examined	Anti-HCV positive		Total examined	Anti-HCV positive	
		No	%		No	%		No	%
<1	11	-	-	15	-	-	26	-	-
1—9	266	4	1.5	211	2	0.9	477	6	1.3
10—19	474	17	3.6	378	4	1.1	852	21	2.5
20—29	783	32	4.1	872	17	1.9	1655	49	3.0
30—39	662	48	7.3	728	21	2.9	1390	69	5.0
40—49	456	41	9.0	630	22	3.5	1086	63	5.8
50—59	354	30	8.5	360	14	3.9	714	44	6.2
=>60	223	7	3.1	139	9	6.5	362	16	4.4
P value	0.0001 (Highly significant)			0.003 (Highly significant)			0.0001 (Highly significant)		

Discussion:

Hepatitis B and hepatitis C virus infections are major public health concern due to their serious complications on one hand, and their transmission by routes that permits intrafamilial spread on the other hand .[12, 13, 14]

Comparing with the scale of WHO (<2%) that considered Iraq as having low prevalence of hepatitis B [15] and other previous studies before the year 2003.[16, 17, 18, 19] the present study found that the seroprevalence of HBV was found to be intermediate to highly endemic.

However, HCV seroprevalence was found to be peaked significantly during 2006 in patients with liver complaints while during year 2003 in apparently healthy individuals.

Comparing with studies before year 2003, infection among blood donors was found to be much lower than our results [9]. However, our results were found to be lower than studies in multiple blood recipients and the general population [20].

On note, there was a shortage in laboratory kits for detection of anti-HCV and instrumental malfunction during the years of our study for 1-2 months/year.

In Iraq, the protracted conflict and violence continued to stretch the available resources and the resilience of health infrastructure in the country.

In 2006, Iraq increasingly faced a critical situation of internal turmoil, which confronted the first results of reconstruction gained since 2003. Health professionals and facilities have been first targeted in armed groups operations.

Increased emergency casualties and continued deterioration in the security situation stretch the capacity of emergency and health services.

After steady improvements observed in 2005, drawbacks in access to health services were experienced in 2006 as a result of the deteriorating security situation.

The results of the post-war rapid assessment of the blood bank services conducted during 2003 illustrated the dilapidated state of these services, and revealed that most of the basic tests aimed at ensuring blood safety could not be performed or were simply performed with inadequate and ageing equipment, while hospitals storage capabilities were rudimentary.

WHO has been supporting the Ministry of Health to reactivate and strengthen the deteriorated National Blood Transfusion Center (NBTC) and 18 donor blood bank services in order to reduce the risk of diseases spreading through blood transfusions [21].

Iraq had been introduced hepatitis B vaccine into their EPI in 1991 however, Gulf war, subsequent sanctions, American occupation and civil conflict, all Infectious disease control programs were disabled and shortages of medicines and vaccines became common and lead to have the possibility presence of defective in application of HBV vaccine program [21,22,23].

In our study, although HBV and HCV showed increasing trends during 2003, 2004, 2006 until fortunately fluctuating in 2008, 2009 and this may be due to the proportional improvement in the security situation which leads to less demand for blood transfusion.

The present results found that HBV infection was significantly higher among females than males complaining of liver diseases and this is inconsistent with other studies [11, 24], but consistent with other study elsewhere [14].

These results may reveal that symptomatic infection in females were more than in males and this could be

Explained according to the fact that immune response is responsible for HBV pathogenesis in liver [25] in which, physiology plays a role.

However, no significant statistical difference in HBsAg positivity was observed between apparently healthy males and females. In addition, the present results found that HCV infection was significantly higher among males than females for both the patients and apparently healthy individuals and this result is in agreement with previous observations elsewhere [11, 24,26].

These findings may be attributed partly to risk behaviors like sexual in males, some social and/or some physiological factors.

The present results found that, the higher HBV seroprevalence was found in age groups <1 year, this may declare about the high rate of transmission vertically from the mother to the fetus. Age at infection is the most important factor determining whether an individual will become a chronic carrier.

The risk of becoming a chronic carrier is inversely proportional to age at infection (27).

Also the prevalence was found to be higher significantly in age ≥40 years and this result is consistent with

Others [24, 28].Regarding the age distribution of anti-HCV the higher prevalence age was≥30 years and females≥60 years significantly.

These conducted elsewhere [24,26,29] .The average age groups of patients with HBV and HCV infections was 40 years, which was in agreement with other societies[26] and this probably because these age groups have higher chance for exposure to HBV infection and sexual activity and intimate contact may be important in disseminating the virus.

Findings of the present study also revealed that there were no seasonal transmission of HBV & HCV .This result was consistent with most previous reports affirming no seasonality in transmission of these viruses[23]but inconsistent with others[24].

In developing countries like Iraq, blood transfusion is a major problem [20].

Therefore, to minimize the risk of transmission of HBV &HCV infection through blood transfusion; we should introduce a sensitive screening methods that may detect infectious agents during the window period with the use of nucleic acid testing, particularly in advanced economies [30].

References

1. Azam Q, Fayyaz M, Khan M , Chaudhary G and Qazi M.A. Hepatitis B, C & HIV; Sero-Prevalence of Infection in Blood Donors. Professional Med J Dec. 2006; 13: pp. 632-636.
2. Liu WC, Mizokami M, Buti M, Lindh M, Young KC. Chang TT Simultaneous quantification and genotyping of hepatitis B virus for genotype A to G by Real-Time PCR and Two-Step Melting Curve Analysis. J. Clin. Microbiol. 2006; 44: pp. 4491-97.
3. Alavian S, Hajarizadeh B, Ahmedzad-Asl M, Lankarani. Hepatitis B virus infection in Iran: Asymptomatic Review. Hepatitis Monthly.2008; 8 (4): pp. 281-294.
4. John D, Synder and Larry K.P; Viral Hepatitis. In: Behrman RE; Arvin AM (eds.): Nelson Textbook of pediatrics. 16th ed. Philadelphia, WB Saunders, 2000, chapter: 177 p786 -775
5. Barbara S K Dennis D B: The Gastrointestinal tract .In: Behrman RE; Kliegman RM; (eds):Nelson essentials of Pediatrics. 3rd/Philadelphia, WB Saunders,1998,chapter 11:p:447-449
6. Hall AJ. Control of hepatitis by children vaccination. *Reviews in medical microbiology*, 1994, 5(2):123–30.
7. Intercountry workshop on the prevention and control of viral *hepatitis*. Alexandria, World

Health Organization Regional Office for the Eastern Mediterranean, 1995.
8. Toukan A. Control of hepatitis B in the Middle East. In: Rizzetto M, ed. Proceedings of IX Triennial International Symposium on Viral *Hepatitis and Liver Disease*. Turin, Edizioni Minerva Medica, 1997:678–9.
9. Al-Hilli HA, Ghadhban IM et al. Prevalence of serological markers of hepatitis B virus (HBsAg) and hepatitis C (HCV Ab) among blood donors and certain risk groups. J fac Med Baghdad 2000; 42:45-52
10. Andre F. Hepatitis B epidemiology in Asia, the Middle East and Africa. *Vaccine* 2000; 18: 20-22.
11. Hamied L, Abdullah R M, Abdullah A M Seroprevalence of Hepatitis B and Hepatitis C virus infection in Iraq The N Iraqi J Med. 2010; 6(3): 69-73
12. Kyi KP, Aye M, Do KM, Htun Moha O, SS ,L win KO, Win KM Prevalence of hepatitis C in healthy population and patients with liver Aliments in Myanmar. Regional Health Forum WHO South- East ASIA REGION 2002, 6, (1)
13. Alizadeh AH, Ranjbar M. and Yadollahzadeh M. Patients concerns regarding chronic hepatitis B and C infection. East Medit. Health J. 2008; 14(5): 1142-7.
14. Hasan, A. SH. Intrafamilial clustering of hepatitis B infection. Iraqi J. Commun. Med. 2005; 18(2): 134-9.
15. www.health.gov.au WHO, 2002. Hepatitis B. Department of Communicable Disease Surveillance and Response.
16. Mohammed (1996): Current situation and plan of prevention. Conference of viral hepatitis, Baghdad, 14th May. Cited by Hassan, A, M. A seroepidemiological survey on HBsAg and anti-HCV in Babylon Governorate, M.Sc. Thesis submitted to College of Science, University of Babylon.
17. Al-Shammery NA, Seroprevalence of hepatitis C virus among risk groups in Kirkuk city. MSc. thesis College of Medicine: Tikrit University 1996
18. Kaitano AE. Prevalence of hepatitis B surface antigen (HBsAg) and hepatitis C (HCV) in Salahdeen province. Diploma dissertation, College of Medicine, Tikrit University 1996
19. http://www.pdhealth.mil/deployments/iraqi_freedom/endemic.asp.
20. Al-Kubaisy WA, AL-Naib KT, Habib M. Seroprevalence of hepatitis C virus specific antibodies among Iraqi children with thalassemia. East Mediterr Health J. 2006; 12(1-2):204-10
21. http://www.emro.who.int/iraq/pdf/annualreport_(2006) (22) Ali HY. Hepatitis B infection among Iraqi children: the impact of Sanctions .East Mediterr Health J 2004 Jan-Mar; 10(1-2):6-11.
23. Abdul Hussein A, AL-Janabi S.. Efficiency the Application of HBV Vaccination Program to Clinical Laboratory Workers against Hepatitis B Infection in Karbala-Iraq Asian Journal of Medical Sciences 2009 1(2): 54-56,
24. Al-Jebori A S, Hasan A S, Al-Duliami A A Seroprevalence of hepatitis B and hepatitis C virus infections in Diyala province during 2003-2008.*vetmed.uodiyala.edu.iq/uploads/v1/Research/4.docx*
25. Koziel, M.: Immunology of viral hepatitis. Am. J. Med (1996);100(1):98-109.
26. El-Hazmi, M.M. Prevalence of HBV, HCV, HIV-1, 2 and HTLV-I/II infections among blood donors in a teaching hospital in the central region of Saudi Arabia. Saudi Med. J. 2004; 25(1): 26-33
27. Edmunds WJ ,Medley GF, Nokes DT, Hall AJ, Whittle HC. The influence of age on the development of the hepatitis B carrier state. Proceedings of the Royal Society of London. Series B. Biological *sciences*, 1993, 253:197–201. (28) Al-Khayatt R., Al-Najar A, Al-Hamdani A.: Seroepidemiological prevalence study of Hepatitis D among HBsAg positive patients. Juornal of basic Medical sciences 2003;3(3,4):243-245
29. Khattab OS. Prevalence and risk factors for hepatitis C virus infection in hemodialysis patients in an Iraqi renal transplant center. Saudi J Kidney Dis Transpl 2008; 19(1):110-5.
30. Polizzotto MN, Wood EM, Ingham H, Keller AJ (2008). Reducing the risk of transfusion transmissible viral infection through blood donor selection: the Australian experience 2000 through 2006. Transfusion, 8: 55 – 63.

*Lecturer, Department of Microbiology/College of Medicine, Al-Mustansiriya University,
**Virology Lab. /Al-Yarmook Teaching Hospital, Ministry of Health
e-mail;Dr.Arwaalhamdani@yahoo.com
Tel.07812428996