



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2019; 7(6): 796-799

© 2019 JEZS

Received: 25-09-2019

Accepted: 27-10-2019

**Hiro M Obaid**

Environment and Pollution  
Engineering Department,  
Technical College Kirkuk,  
Northern Technical University,  
Iraq

**Braihan H Hameed**

Medical Laboratory Techniques  
Department, Technical College  
Kirkuk, Northern Technical  
University, Iraq

## Viral hepatitis incidence among vaccinated and non-vaccinated individuals in Kirkuk city, Iraq

**Hiro M Obaid and Braihan H Hameed**

### Abstract

Viral hepatitis is a common serious human disease, infecting liver. Hepatitis A, B and C viruses are most responsible for human infection. The aim of this study was to detect the prevalence of viral hepatitis in Kirkuk city and identify the role of the vaccination process. In order to do that, two methods (cassette and ELISA) were used to detect the hepatitis. The overall prevalence of the hepatitis was 8.6%. Of the 802 screened individuals, 217 of them were vaccinated and hepatitis appeared among the vaccinators with a rate of 5.1%. The most predominant viral type in the investigation, was HCV with a rate of 5.1%, followed by HBV and HAV each with a rate of 3.3, 0.25% respectively. Thalassemic patients had a higher incidence of hepatitis (18%), compared to other groups of the study, followed by patient's complaint form hepatic disorders. The conclusion is that; viral hepatitis type C is more prevalent among Kirkuk population than type B and A. People vaccinated against the disease may appear to be infected with the virus. Thalassaemia patients are more at risk to have hepatitis infections. Therefore the recommendation is that; more advanced tests are better used to test blood before receiving it, especially in thalassaemia patients. Kirkuk residences are better to pay more attention to the vaccination process for more protection against hepatitis, especially those non-vaccinated or who have not received booster doses, more serious attempts need to make effective vaccine against type C virus.

**Keywords:** Viral hepatitis, vaccination, Kirkuk city

### Introduction

Hepatitis is a human disease, that causes liver tissue inflammation, its possible causes other than viruses are, alcoholism, non-alcoholic steatohepatitis, autoimmune disease, defined types of drugs, and some other infections<sup>[1, 2]</sup>. Viral hepatitis includes, type A, B, C, D and E<sup>[2]</sup>. Contaminated food or beverage are the main ways of type A and E transmission, whereas type B and C are commonly transmitted through blood, such as among intravenous drug users. Hepatitis B may also be sexually transmitted or congenitally from pregnant women to their children. Type D only affects those who have already been infected with type B<sup>[2, 3]</sup>. Hepatitis infection in some people is asymptomatic, while skin yellowing or some other symptoms like abdominal pain, vomiting, loss of appetite, tiredness or diarrhea can appear in others<sup>[4, 5]</sup>. Acute hepatitis may resolve on its own, or may transform to chronic infection that may last for many years and can finally cause liver dysfunction or cancer<sup>[5]</sup>. Immunization can have preventable rule against type A, B and D<sup>[6]</sup>. Chronic viral and auto immune hepatitis can be treated by certain medication. However, healthy lifestyle (healthy diet, physical activities and weight loss) can be helpful in prevention. A liver transplantation opportunity in certain cases may also be a choice<sup>[2]</sup>. Despite the immunization process, annually huge numbers of population worldwide are infected with hepatitis. In 2015 about 3370 million was infected with type B, 1390 million was infected with type A and other 2436 million people were infected with type C<sup>[7]</sup>. Each year, death due to liver damaging or liver cancer resulted from viral hepatitis, occur in huge number of people<sup>[8]</sup>.

### Materials and Methods

**Samples collection:** From July 2017 to March 2018, 802 blood samples of both healthy and patient individuals were screened for viral hepatitis. The patients were attended Kirkuk General and Azadi Teaching hospitals. They complaint of hepatic disorders, blood receivers (thalassaemia), having dental surgery and those patients who had done cupping therapy (traditional treatment using blood sucking cups or needles). Whereas the healthy persons not complaint from any diseases disorder (including those how had done the tattoo) were chosen

**Corresponding Author:****Hiro M Obaid**

Environment and Pollution  
Engineering Department,  
Technical College Kirkuk,  
Northern Technical University,  
Iraq

from samples of all Kirkuk population. All samples were screened using cassette test (CTK Biotech, Inc., USA). The cassette positive samples were confirmed by ELISA test (Foresight, Cat., Spain). Data of information from all individuals were collected, including: Age, sex, living area, if the person has vaccinated or not.

**Cassette test for hepatitis virus (A, B, C):** Five ml of blood samples were taken from all subjects under study. Sera were prepared by centrifugation. A qualitative rapid immuno-assay using cassette test were done based on capillary migration. 75µl (two drops by kit dropper) of each serum sample was added to the cassette well and let for 10 minutes. During migration, the serum specimen reacts with the membrane pre-coated particles at test mark of the cassette. The appearance of a colored line at the test mark of the cassette was considered as positive result whereas its nonappearance considered as a negative result.



**Fig 1:** Hepatitis cassette positive sample.

The overall prevalence of hepatitis among Kirkuk population was 69/802 (8.6%) as shown in Table 1.

**Table 1:** Incidence of viral hepatitis

Total No. examined	No. of +ve samples	No. of -ve samples
802	69	733
percentage	8.6	91.4

Low number (217/802) of studied cohort were vaccinated against hepatitis B. Of those who were vaccinated, a proportion of 5.1% were infected, as presented in Table 2.

**Table 2:** Hepatitis incidence among type B vaccinated persons.

Examined number	Total	No. of type B vaccinated persons	No. of +ve cases	No. of -ve cases
	802	217	11	206
Percentage	%	27.1	5.1	94.9

The most prevalent viral type was HCV with an overall rate of 5.1%. Followed by type HBV with a rate of 3.3%. The lowest frequency was for type HAV with a rate of 0.25%, as given in Table 3.

**ELIZA method for hepatitis virus (A, B, C):** All cassette positive serum samples were retested by ELIZA, for detection of hepatitis IgG and IgM. According to the kit instructions, the blank, positive and negative control wells were prepared. 100 µl of the sample diluent were pipetted into each tested wells. The plate wells were rocked for 20 seconds, then covered and incubated at 37 °C for 30 minutes. The mixture was removed and washed five times by ELIZA washer. Apart from the blank, 100 µl of HRP protein conjugate was pipetted into each well and incubated at 37 °C for 30 minutes. The wells were once more washed 5 times. Together with the blank, 50 µl of substrate A and B were pipetted into all wells, then incubated at 37 °C for 10 minutes in a dark place. With 50 µl of the stop buffer, all reactions were stopped and the color altered from blue to yellow. The absorbance was read at 450 nm, the optical density was measured against the blank.

### Results

All cassette hepatitis positive samples were positive when confirmed with ELISA test. Figure 1, illustrates cassette positive sample.

**Table 3:** Viral hepatitis incidence according to virus type.

Examined No.	Viral types		
	C %	B %	A %
Total No. (802)	41 5.1	26 3.3	2 0.25
Total +ve No. (69)	41 59.4	26 37.7	2 2.9

Males were almost more infected with hepatitis than females. Of 418 screened males, 38 (9%) were infected, and of 384 screened females 31 (8%) were infected, as mentioned in Table 4.

**Table 4:** Viral hepatitis frequency according to gender.

Gender	No. of examined Sample %	No. of +ve Samples %	No. of -ve Samples %
Male	418 52	38 9	380 91
Female	384 48	31 8	353 92
Total	802 100	69 8.6	733 91

The highest percentage of hepatitis was in thalassemia patients (61/331), with a rate of 18%. Followed by those patients whom had complaint from hepatic disorders (4/12) with a rate of 33.3%, as given in Table 5.

**Table 5:** Viral hepatitis incidence among persons with a history of the risk of the disease.

Studied cohort	Examined No. %	+ve %	-ve %
Blood receivers (thalassemia)	331 41.2	61 18	270 82
Dental surgery	119 14.8	3 3	116 97
Cupping therapy	88 11	1 1.1	87 98.9
Tattoo	56 7	0 0	56 100
Patients with hepatic disorders	12 1.5	4 33.3	8 66.6
Healthy persons	196 24.4	0 0	196 100
Total	802 100	69 8.6	733 91

Hepatitis was more prevalent among young ages compared to middle and older ages. The frequency rate was 8.9% in 5-15

years old, and was 10.9% in 16-25 years old, as mentioned in Table 6.

**Table 6:** Viral hepatitis incidence relative to age groups.

Ages in years	Total No. Examined %	+ve No. %	-ve No. %
5-15	179 22.3	16 8.9	163 91.1
16-25	237 29.9	26 10.9	211 89.1
26-35	203 25.3	13 6.4	190 93.6
36-45	101 12.5	9 8.9	92 91.1
46-60	82 10.2	5 6.1	77 93.9
Total	802 100	69 8.6	733 91

## Discussion

Viral hepatitis is a universal disease. Annually a large proportion of people get sick from hepatitis [7]. Viral hepatitis type A appears frequently in the early stages of life. The vast majority of patients may not show any signs. Nearly all patients recover entirely and without any ongoing indications. Death due to acute hepatitis is very few [9]. Hepatitis B and C viruses are the world's leading cause of disease and death especially in the developing countries [10]. The infection with these viruses can lead to cirrhosis of the liver, hepatocellular carcinoma and death [11, 12]. The incidence of HAV in this study was 0.25%. While HBV and HCV was 3.3% and 5.1%. Much higher (41%) rate of HAV have been recorded in Iraq [8]. Among Kirkuk population, a study done by Raof [13], showed that, the prevalence of hepatitis B and C was 1.6, 0.4 % in blood donors. Another Iraqi study carried out in Diyala province, revealed a prevalence rate of 0.65% for HBV infection and a rate of 0.043% for HCV infection [14]. Approximately equal frequencies (0.29, 0.26%) of hepatitis B and C were noted in 2016 in Babylon region, Iraq [15]. Also a prevalence rate of 0.78, 0.2% was recorded for each of hepatitis B and C in Dohok, and a prevalence of 2.6, 1.1% was recorded in Kirkuk in years 2013, 2014 respectively [16, 17]. Even though the prevalence rate of hepatitis B was 0.7% and hepatitis C was 0.4% among patients undergoing surgery in Sulaimany city [18].

The occurrence of HBV and HCV fluctuates from place to place. In an additional study accomplished in Saudi Arabia, it was found that, the spread of HBV was 3.8% and HCV was 0.4% among blood donors [19]. Hepatitis B and C infection rates in the current study was much lower than that in a study in Palestine, which found that, HBV and HCV was 3.8% and 51% among hemodialysis patients [20]. Although further study in Egypt enrolling healthy volunteer blood donors, reported a positivity rate of 5% in HBV infected persons [21]. One more Egyptian investigation reported that the occurrence of HCV was as high as 51% [22]. This difference could be attributed to the heterogeneity of the studied populations, subject selection, sample sizes, times of the studies and the used diagnostic strategies.

The results in this study presented that, the incidence of HCV infection is more compared to HAV and HBV infections. This result is consistent with another study [23] which indicated much higher frequency of HCV than hepatitis B amongst population. Such a decline might be due to that, the HBV infection is an avoidable and vaccine-preventable infection. Vaccination had a significant role for strong prevention of the HBV type [24]. Though, this study disagreed with other studies which displayed that, the frequency of HBs Ag is greater than anti-HCV among the studied population [13, 18, 19, 25]. The current study revealed that, the thalassemia patients are more at risk of developing hepatitis infection other than other

population, because repeated exposure of thalassaemic patients to the injections increased the risk of getting HBV and HCV with age and has led to high morbidity in thalassemia patients [14]. This study also verified an elevation of anti-HCV in thalassemia patients, which agreed with previous studies [14, 26]. A study reported by Alawady, revealed a higher rate of hepatitis C infection among patients with inherited blood disorders, who received multiple blood transfusions in Babylon, Iraq [27]. Al-Kubaisy, et al. [28] found a very high frequency of HCV infection (67.3%) amongst children with thalassemia in Baghdad. Among the viral hepatitis positive patients of this study, higher prevalence found in male (9%) than in female patients (8%), which is consistent with other studies [18, 26, 28, 29, 30, 31]. Although, the results of the current study did not agree with that was stated in other Iraqi studies, which had a higher infection rate of females than males [25, 32, 33]. The prevalence of HBV and HCV infections are more in the age group of 16-25 years. This finding is in agreement with other studies [26, 34]. However, the present study is different from a study which showed that, patients over the age of 40 years were more sensitive to HBV and HCV than younger ages [18]. Differences in hepatitis virus prevalence rates by age and sex in different studies may be due to risky sexual behaviors among males or due to the influence and exposure to different risk factors, religious beliefs and social comportment in various societies [34].

## Conclusion

The conclusion is that; viral hepatitis type C is more prevalent among Kirkuk population than type B and A. People vaccinated against the disease may appear to be infected with the virus. Thalassemia patients are more at risk to have hepatitis infections. Therefore the recommendation is that; more advanced tests are better used to test blood before receiving it, especially in thalassemia patients. Kirkuk residences are better to pay more attention to the vaccination process for more protection against hepatitis, especially those non-vaccinated or who have not received booster doses, more serious attempts need to make effective vaccine against type C virus.

## References

1. Chow, James H, Chow, Chery. The encyclopedia of hepatitis and other liver diseases. First edition. Facts on File publisher. New York, United States. 2006; p.105.
2. Williams R. Global challenges in liver disease. *Hepatology*. 2006; 44(3):521-526. doi:10.1002/hep.21347. PMID 16941687.
3. WHO. Global Hepatitis Report 2017. Geneva: World Health Organization; 2017; Licence: CC BY-NC-SA 3.0 IGO. CIP data are available at <http://apps.who.int/iris>.
4. Rubin, Emanuel MD, Strayer, David S, Raphael, Rubin.

- Rubin's Pathology: clinicopathologic foundations of medicine. Fifth edition. Lippincott Williams and Wilkins. Wolters Kluwer business. Philadelphia, USA. 2008.
5. Irving GJ, Holden J, Yang R, Pope D. Hepatitis A immunization in persons not previously exposed to hepatitis A. *Cochrane Database of Systematic Reviews* 2012; Issue 7. Art. No.: CD009051. DOI: 10.1002/14651858.CD009051.pub2.
  6. Terrault N, Roche B, Samuel D. Management of the hepatitis B virus in the liver transplantation setting: a European and an American perspective. *Liver Transplant.* 2005; 11(7):716-32. doi:10.1002/lt.20492. PMID 15973718.
  7. El-Serag HB. Hepatocellular carcinoma. *New England Journal of Medicine.* 2011; 365(12):1118-27. doi:10.1056/NEJMr1001683. PMID 21992124.
  8. Turkey, Ataallah M, Akram, Wijdan, Al-Naaimi, Ahmed, *et al.* Analysis of acute viral hepatitis (A and E) in Iraq. *Global Journal of Health Science.* 2011; 3(1):70-76.
  9. 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; 44:4491-97.
  10. European association for the study of the liver. EASL clinical practice guidelines: Management of chronic hepatitis B virus infection. *J Hepatol.* 2012; 57(1):167-85.
  11. European Association for Study of L. EASL Clinical Practice Guidelines: management of hepatitis C virus infection. *J Hepatol.* 2014; 60(2):392-420.
  12. Raof, Abdullah A. Seropositivity of hepatitis B, hepatitis C, HIV and VDRL infections among blood donors in General Kirkuk Hospital. *Ankara Med J.* 2015; 15(3):120-126.
  13. Al-Taie WS, Ali EA, Shafiq HAR, Noaman NG, Al-Jobori FA *et al.* Seroepidemiology of hepatitis B and hepatitis C virus infections in Diyala province: A population based survey. *Int J Curr Microbiol App Sci.* 2014; 3:449-460.
  14. Saleh, Rasha H, Hadi, Bara H. Correlation between the Prevalence of Hepatitis B and C Viruses against Tumor Necrosis Factor-  $\alpha$  among Patients in Babylon Province BMRJ. 2016; 12(3):1-10.
  15. Hussein, Nawfal R, Haj, Sefar M, Almizori, Lokman A *et al.* The prevalence of hepatitis B and C viruses among blood donors attending blood bank in Duhok, Kurdistan region, Iraq. *Int J Infect.* 2017; 4(1):1-6.
  16. Ibrahem AM, Mohiadeen FA, Babakir-Mina M. Prevalence, knowledge and practices of hepatitis B and C viruses among patients undergoing surgery in Sulaimani city. *J Rare Disord Diagn Ther,* 2017, 2(6). Doi: 10.21767/2380-7245.100053.
  17. Obaid, Hiro M, Juma Shawbow A. TORCH screening test in pregnant women of Kirkuk city. *Al-Mustansiriyah J Sci.* 2016; 27(5):17-25.
  18. Abdullah, Saleh M. Prevalence of hepatitis B and C in donated blood from the jazan region of Saudi Arabia. *Malays J Med Sci.* 2013; 20(2):41-6. [PubMed: 23983576].
  19. Al Zabadi H, Rahal H, Fuqaha R, Hepatitis BC. prevalence among hemodialysis patients in the West Bank hospitals, Palestine. *BMC Infect Dis.* 2016; 16:41.
  20. Awadalla HI, Ragab MH, Osman MA, Nassar NA. Risk factors of viral hepatitis B among Egyptian blood donors. *Br J Med Med Res.* 2011; 1(1):7-13.
  21. Sarhan II, Kamel CR. Prevalence of hepatitis C virus seroconversion among hemodialysis patients in Egypt. *Egypt Liver J.* 2015; 5(2):34-9.
  22. Abdullah, Sinjari HY, Bakr KA. Prevalence and Risk Factors of Hepatitis B and C Virus Infections Among Patients Undergoing Hemodialysis in Kurdistan, Iraq, *Hepat Mon.* 2018; 18(5):e11776. doi: 10.5812/hepatmon.11776.
  23. Hanafiah, Mohd K, Groeger J, Flaxman AD, Wiersma ST. Global epidemiology of hepatitis C virus infection: new estimates of agespecific antibody to HCV seroprevalence. *Hepatology.* 2013; 57(4):1333-42.
  24. Al-Hamdani, Arwa H, Al-Rawy, Sarab K, Khamees, Hind A. Retrospective seroprevalence study of hepatitis B and C in Iraqi population at Baghdad: A hospital based study. *Iraqi J Comm. Med.* 2012; 3:186-190.
  25. Chattopadhyay S, Mukherjee R, Nandi A, Chakraborty PS, Rit K, Chaudhuri SJ. Prevalence of hepatitis B and C in thalassemia patients in a tertiary care hospital in West Bengal. *IOSR-JDMS.* 2014; 13(7):68-70.
  26. Al-awady NB. Prevalence of Hepatitis C virus infections among Iraqi patients registered to Babylon center for inherited blood disorders. *IJAR.* 2014; 2(1):383-388.
  27. Al-Kubaisy WA; Al-Naib KT; Habib MA. Prevalence of HCV/HIV co-infection among hemophilia patients in Baghdad. *East Mediator Health J.* 2006; 12(3-4):264-9.
  28. Ataallah MT, Akram W, AL-Naaimi AS, Omer AR. Epidemiology of viral hepatitis B and C in Ragi national survey 2005-2006. *Zanco J Med Sci.* 2013; 17(1):370-80.
  29. Sheikh MY, Atla PR, Ameer A, Sadiq H, Sadler PC. Seroprevalence hepatitis B and C infections among healthy volunteer blood donors in the central California Valley. *Gut and Liver.* 2013; 7(1):66-73.
  30. Sood S, Malvankar S. Seroprevalence of hepatitis B surface antigen, antibodies to the hepatitis C virus, and human immunodeficiency virus in a hospital-based population in jaipur, rajasthan. *Indian J Community Med.* 2010; 35(1):165-169. doi:10.4103/0970-0218.62588
  31. Abdulghani MA, Gailan A, Amina HA. Seroprevalence of Hepatitis C Virus in Iraqi Population. *JOJ Immuno Virology.* 2016; 1(3):555565. DOI:10.19080/JOJIV.2016.01.555565.
  32. Hamied L, Abdullah RM, Abdullah AM. Seroprevalence of Hepatitis B and Hepatitis C virus infection in Iraq The N Iraqi J Med. 2010, 6(3):69-73
  33. Anwar MI, Rahman M, Hassan MU, Iqbal M. Prevalence of Hepatitis C virus infections among general public of Lahour Pakistan. *Virol J.* 2013; 10:351.
  34. Masood Z, Jawaid M, Khan RA, Rehman S. Screening for Hepatitis B and C a routine pre-operative investigations. *Park J Med Sci.* 2011; 21(4):455-459.