

## Review Article

# Hepatitis B Virus (HBV): A Review on its Prevalence and Infection in different areas of Iraq

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**Abstract:** Hepatitis B is a severe infection of liver caused by the hepatitis B virus (HBV) lead to progressive liver diseases, such as hepatitis, liver cirrhosis and hepatocellular carcinoma (HCC). It can cause acute and chronic infections. HBV infection is one of the serious concerns and a constant threat to public health. WHO ranks HBV among the top ten killers. It is estimated that more than 350 million hepatitis B carriers are present worldwide. This disease is generally transmitted through exposure to infected body fluids. Perinatal or vertical transmission is the major route of transmission in endemic areas. The incubation period of HBV varies from 1 to 6 months. Serological tests are conducted to detect antigens and antibodies in the serum of patients. ELISA is used to detect HBV antigen and antibody and PCR is used to detect HBV-DNA. There is no treatment available for acute infection. Chronic cases can be treated with medications. HBV infection is easily preventable with a vaccine. The present study focused on the compilation and review of (30) papers on the prevalence of HBV infection by Iraqi researchers in different areas of Iraq.

**Keywords:** Hepatitis B Virus, ELISA, PCR, HBsAg, Blood samples.

## 1. Introduction

Hepatitis B virus (HBV) belongs to Orthohepadnavirus genus a member of the Hepadnaviridae family that leads to hepatitis B, liver cancer, and liver cirrhosis (Sadik *et al.*, 2014). HBV infection is one of the major concerns and a constant threat to public health. It is estimated that there are more than 350 million hepatitis B carriers in the world (Zhu *et al.*, 2014). HBV causes significant morbidity and mortality. Approximately 1 million people die from HBV every year, this is equal to around 2 HBV related deaths each minute. HBV variants may differ in its virulence, models of serologic reactivity, pathogenicity, response to treatment and global distribution (Al-Suraifi *et al.*, 2016). The prevalence of HBV positivity varies from country to country, ranging from 0.5% in some developing countries to 8% in some Asian countries (Alavian *et al.*, 2012; Baiani *et al.*, 2010). Hepatitis B virus (HBV) is one of the most common viruses in modern times and ranked among the top 10 killers by the WHO (Othman *et al.*, 2013).

The history of modern research on viral hepatitis started in 1963 when Nobel Prize winner American physician and geneticist Baruch S. Blumberg (1925–

2011) for the first time publicly reported on the detection of a new antigen called Australia antigen (AuAg) (Gerlich, 2013).

Hepatitis B is an enveloped DNA virus consists of a circular, partially double-stranded DNA genome of 3.2 kb in size, which contains four overlapping open reading frames (ORFs) that code for surface proteins (HBsAg), core proteins (HBcAg/HBeAg), the transcriptional transactivator X protein (HBx) and the viral polymerase (Zhang *et al.*, 2006).

## 2. HBV Transmission, Incubation period, Pathogenesis

### 2.1 HBV Transmission

Perinatal or vertical transmission is the main cause of infection in endemic areas. Perinatal infection often occurs when the mother is HBeAg-positive and has a high amount of serum HBV-DNA. If HBsAg-positive mother does not receive perinatal hepatitis B vaccine and immunoglobulin prophylaxis, possibility of infection in infants born to HBsAg positive and negative mothers is 70-90% and 10-20%, respectively, 90% of which progress to chronic infection.

Transmission route of HBV infection by sexual contact between adolescents and adults in the countries with low and medium prevalence rates of hepatitis B and transfer of blood or serum via shared syringe in drug abusers has also been reported.

Other transmission routes include parenterally by skin and mucous membrane infections caused by contaminated blood or body fluids (blood transfusion, use of contaminated syringes, invasive tests or surgery), and indirectly through hemodialysis, razors, toothbrushes acupuncture therapy, tattooing, and ear piercing (Kwon & Lee, 2011).

## 2.2 Incubation period

Hepatitis B is a highly resistant virus which can withstand high temperature and humidity. HBV can survive when stored at  $-20^{\circ}\text{C}$  for 15 years, at  $-80^{\circ}\text{C}$  for 24 months, at room temperature for 6 months and at  $44^{\circ}\text{C}$  for 7 days (Willis, 2007).

## 2.3 Pathogenesis

HBV plays an important role in the development of progressive liver diseases, such as hepatitis, liver cirrhosis and hepatocellular carcinoma (HCC). HBV and HCV or HIV coinfections may increase the risk of HCC. Chronic hepatitis appears to be caused by a suboptimal cellular immune response which destroys some of the infected hepatocytes and does not purge the virus from other infected hepatocytes, this allows the persistent virus to cause a chronic, indolent necroinflammatory liver disease which sets the stage for HCC development. However, HBV-related HCC pathogenesis is incompletely clarified. Hepatitis B virus X protein (HBx), an important transforming inducer, plays a significant role in the occurrence, invasion and metastases of HCC (Zhang *et al.*, 2006).

## 3. Diagnosis and Treatment of HBV

### 3.1 Diagnosis

HBV infection can be detected 30-60 days after exposure. The diagnosis is usually confirmed by blood test for acute and chronic HBV infection. The presence of HBsAg and IgM antibody to the core antigen, HBeAg in the blood are indicators of acute HBV infection. In the initial stage of infection, patients are also seropositive for HBeAg. HBeAg is usually a marker for high levels of virus replication and indicates that the blood and body fluids of the infected individual are highly infectious. Chronic infection indicates persistence of HBsAg for a minimum period of 6 months. Persistence of HBsAg is the main risk factor for the development of chronic liver disease and hepatocellular carcinoma (Mahoney, 1999). Screening of hepatitis B virus (HBV) is done with serological testing. ELISA tests were used to detect HBV antigen (HBsAg) and HBV antibodies (HBcAb and HBsAb) and PCR tests for HBV-DNA in human plasma or serum (Kurdi *et al.*, 2014).

### 3.2 Treatment

HBV infection is easily preventable with a vaccine. There is no specific treatment for acute infection, treatment is supportive. Patients with evidence of chronic infection can be treated with antiviral therapies to prevent progression of liver fibrosis and development of hepatocellular carcinoma. Pegylated interferon alfa-2a, Tenofovir and entecavir are the most potent first-line treatments to suppress the hepatitis B virus infection (Mahoney, 1999).

### 3. Hepatitis B Virus (HBV) Infection in Iraq

There are several studies reported on the prevalence of HBV infection with other diseases in different areas of Iraq. The present study focused on the compilation and review of (30) papers on the prevalence of HBV infection by Iraqi researchers in different areas of Iraq.

Al-Jadiry *et al.*, (2013), studied the prevalence of viral hepatitis in cancer diagnosed children, identify variables that might cause this incidence and role of HBV vaccination in preventing infection. From September 2007-June 2008, 256 children were studied in the Haemato-oncology unit, Children's Welfare Teaching Hospital, Baghdad. At the time of diagnosis, patients were screened for HBV and the findings are negative. 231 patients (90.2%) were revaccinated when admitted to the unit. In 70 patients (27.3%) HBV infection was observed at reassessment after cancer treatment. A variable such as diagnosis of leukaemia significantly increased the risk of HBV infection and receives more than 3 blood units. The high rate of HBV infection observed in this study.

Ismail (2013), determines the prevalence of HBsAg and its associated parameters in pregnant women in Baghdad Province. Healthy pregnant women and their families have been selected as study subjects and who had attained prenatal care clinics in Baghdad province from 2010-2012. Of these, 234 cases were selected for the study. Their age ranged from 16 to 42 years. Serological test was done for HBV using the ELISA test. Based on different parameters, HBsAg has been positive in pregnant women and their children were negative constitute the highest percentage 85.4% and the lowest was pregnant women living with positive family history of HBV were 8.9%.

Hassab *et al.*, (2016), investigate the distribution of serological patterns for HBV, which were negative for HBsAg. From July 18, 2011, to December 25, 2011, 10ml of blood samples from 25782 blood donors (25294 male, 488 female), mean age (20-65) years were collected from National blood Transfusion Center donors, Baghdad. Excluded 185 HBsAg positive serum donors. Finally, 25597 HBsAg negative blood donors were included in the study. By Architect system 1000 (3.8%) donors were positive for anti-HBc while HBsAg negative

was found in 24597 (95.4%). Among 1000 cases of previous HBV infection, Anti-HBc with anti-HBs was observed in 685 (68.5%). Anti-HBc alone was seen in 315 (31.5%) cases.

Thabit *et al.*, (2017), shows awareness of hepatitis B infection among Health and Medical Specialty students. A cross-sectional analysis, including 107 students was carried out at Nursing College and Technical College of Health and Medicine, Baghdad during November and December 2015. They completed a self-structured questionnaire consisted of socio-demographic characteristics, source of HBV information and various statements regarding HBV knowledge. Academic lectures (55.1%) are the main source of HBV information followed by mass media 39.2%. The student's knowledge responses were generally disappointing with regard to the mode of transmission. 43% of students were correct on mother to fetus transmission, 39.2% for sexual transmission. 47.6% of students know HBV can be transmitted sexually and 39.5% know HBV can be perinatal, 62.8% know that HBV can be transmitted by using the same toothbrush. Only 41.1% answered correctly regarding the risk for physicians and dentists. The knowledge responses regarding disease Epidemiology and prevention and treatment (vaccination) were satisfactory.

Khudair *et al.*, (2019), detect TTV Ag in healthy blood donors and patients infected with chronic hepatitis B virus or chronic hepatitis C virus by ELISA technique and any possible correlation between the study population demographic data and TTV status. This study was carried out from November 2017 to March 2018. Serum samples of 50 patients were collected who had chronic hepatitis HBV or HCV from Gastroenterology and Hepatology Teaching Hospital. Also, sera were collected from 43 healthy blood donors. The clinical characteristics of both patients and controls such as alanine transaminase (ALT), aspartate transaminase (AST), hepatitis C virus antibody (HCV-Ab), hepatitis B surface antigen (HBsAg) and hepatitis B core antibody (HBcAb) were obtained from hospital records. Serum samples were tested by the ELISA technique for detection of TTV Ag. TTV was detected in 89.2% (33/37) of the HBV-positive patients and in 30.8% (4/13) of the HCV-positive patients versus 23.3% of the healthy blood donor (10/43). This study showed a significantly higher prevalence of TTV in HBV patients than HCV patients and healthy blood donors and TTV may play a role in hepatitis and has been associated with biochemical signs of liver disease and chronic HBV or HCV infections.

Hussein *et al.*, (2017), determine the prevalence of hepatitis B virus and hepatitis C virus in blood donors in Duhok, Northern Iraq. A cross-sectional study was carried out on blood donors attending Duhok blood bank. In this study, 7900 subjects were included from January to December 2014. Subjects were screened for HBsAg

and HCV-Ab. A questionnaire was collected on demographic and personal data of every positive subject. All HCV-positive samples were assessed by RT-PCR to confirm the results. Among the analyzed sample, the prevalence of HBsAg and HCV-Ab were 62/7900 (0.78%) and 16/7900 (0.2%), respectively. The RT-PCR results for quantitation of HCV showed that only 1/7900 (0.013%) patients were HCV-positive. There was no significant difference was observed in the positivity of HBV and HCV between urban and rural donors ( $P > 0.05$ ). In addition, 77% and 75% of HBV- and HCV-positive donors, respectively, had a history of dental treatment.

Hussein (2018), describes the prevalence and risk factors of HBV infection. Blood samples of 438 blood donors were collected from blood bank in Duhok city. Serum samples were tested by ELISA for HBcAb and HBsAg. Different risk factors were noted and multivariate analysis was carried out. Of the subjects, 5/438 (1.14%) were HBsAg positive (HBsAg and HBcAb positive) and 36/438 (8.2%) were HBcAb positive. The data analysis was therefore focused on 41 cases that have been exposed to HBV. Univariate analysis showed that there are significant associations between a history of illegitimate sexual contact, history of alcohol, or history of dental surgeries and HBV exposure ( $p < 0.05$  for all). Multivariate analysis was then conducted to determine HBV exposure predictive factors. The history of dental surgery was found to be a predictive factor for virus exposure ( $P = 0.03$ , OR: 2.397) in Duhok city.

Abdulla and Goreal (2016), were conducted a study to identify HBV genotypes in chronic HBV carriers associated with HBV serological markers. This work was carried out in Duhok, Iraq from March to December 2012 and included 134 HBsAg positive carrier cases. HBV genotypes have been detected using specific primers PCR techniques. The carrier cases were screened for markers of HBV infection by ELISA. The carrier cases were 91 males (67.9%), 43 females (32.1%), and the age range was 10-87 years old (mean=31.4 SD± 13.3). Genotypes D was found in 133 (99.2%) patients, including 91 (67.9%) males and 42 (31.3%) females and only one female patient had genotype B (0.8%). Anti-HBc (total), anti-HBc IgM, HBeAg and anti-HBeAb were detected at rates of 100%, 0%, 50.4% and 46.5% respectively. The patient with genotype B had positive HBeAg, negative HBeAb and normal ALT level. This study showed that hepatitis B virus genotype D is the main genotype followed by genotype B in Duhok, Iraq.

Khaled (2014), examines regular blood transfusion in patients with hereditary hemolytic anemia, particularly thalassemia, which carries a definite risk of blood-borne virus infection after improved overall survival. From March 2012 to May 2012, 480 blood samples were collected from thalassemia center in Ibn Al-Atheer hospital in Ninawa Governorate. Of these, 273 (57%) males and 207 (43%) females. 60 patients aged 1-5 years,

150 aged 6-10 years, 90 aged 16-20 years and 80 over the age of 20 years of age. Result shows Anti-HCV positive patients are 50/480 (10.4%), HCV RNA positive among Anti-HCV positive patients are 44/50 (88%), HBsAg positive is 2/480 (0.4%), and no HIV-positive cases have been reported. The prevalence of HCV infection is higher than that of HBV and HIV infection due to possibly infected blood transfusion among thalassemia patients.

Amen (2013), determines the seroprevalence of HBV among patients with hemodialysis living in Mosul city, Iraq. This study includes (70) patients, (43) Male and (27) Female, age range between 10-60 years, patients above 50 years are more susceptible to HBV (7.1%). This study included age, gender, quantitative of blood pints transfusion, and episodes of big-time spent on hemodialysis. This study showed that male hemodialysis patients had higher HBV prevalence than females (14.2%, 4.2%) respectively. This study shows the prevalence of HBV was increased significantly with increasing the number of blood units transfused. Duration of long term dialysis less than 2 years and more than 10 years is 4.20% of HBV positive patients, (2-4) years and (8-10) years in 1.40% of cases, and (4-6) years and (6-8) years in 2.80%, the meantime of dialysis (5.4) years. By ELISA technique (13) HBV positive were found among hemodialysis patients, but by PCR (12) were found positive with HBV-DNA.

Mousa (2012), evaluate patients with thalassemia and to find out the number of patients infected with hepatitis B. A cross-sectional study carried out in a Tikrit Teaching Hospital involved (50) thalassemia patients. The percentage of hepatitis B among these patients was (10%). Among the seropositive patients, males and females comprised (10%) for each. Patients from urban and rural areas were (9.1%) and (11.8%), respectively. The percentage of non-vaccinated patients with seropositive hepatitis B was (14.3%) compared to the vaccinated patients (6.9%). It has been found that when the amount of blood transfusion increases the risk of hepatitis also increases. Seropositivity for hepatitis B was observed in (18.2%) patients with abnormal liver function test, and (3.6%) of the same group patients had a normal function test. It was revealed that (16.7%) of the seropositive patients had undergone splenectomy.

Saadoon (2016), performed a study in the central blood bank in Tikrit city, from 1st July to 30th April 2002. This study included 1300 blood donors to evaluate the prevalence of HBsAg and its association with age and blood group. This study showed that HBsAg's overall prevalence was 2.6% (34 out of 1300). The highest HBsAg frequency was found in blood group O, followed by B, AB and A. Most HBsAg cases accumulated in the 30-39 year age group and 20-29 year age group

Abdulrazaq and Al-Azaawie (2017), determine genotypes of the hepatitis B virus in chronic hepatitis B infection in Samara City. Blood samples of 96 patients

include males 51 (53%), females 45 (47%) with chronic HBV infection were collected from Samarra General Hospital and blood bank in Samarra city. All the serum samples were tested for HBsAg, HBsAb, HBeAg, HBeAb, HBcIgM, and HBcIgG by ELISA and genotypes determined by PCR. Genotype D was the predominant (93.1%, 81/87) genotype in tested samples. HB genotype C was detected in 3.45% (3/87) of samples examined. HB genotype C & F, A & D, and B & D were detected in 1.15% (1/87) for each. In cases of negative viral load, mean serum IL-17 value was lower ( $2.56 \pm 1.23$ ) as determined by PCR, than all other cases with D and mixed B and D genotypes. ANOVA tests showed no significance. Mean serum IL-17 was  $7.94 \pm 5.64$  in cases with HB D genotype,  $1.56 \pm 0.57$  was with genotype C, 3.25 with B & D genotype, 2.44 with A & D genotype and 1.82 with C & F genotype. The difference in mean serum value (IL-17) was slightly significant between negative cases and with D genotype, but it was significant between D genotype and combined genotypes ( $P=0.0018-0.0001$ ). Study showed that HBV D genotype was predominant.

Majeed (2012), determine the prevalence of the HBV in AL-Anbar Governorate, from January-December 2012. This is a retrospective study carried out at Al-Anbar Central Laboratory. Study group individuals age, sex and residency were recorded. The sera from study group individuals were screened by preliminary screening test, dipstick immunoassay based on immune-chromatography for HBV detection. Then all hepatitis B positive sera were tested for the presence of HBsAg by ELISA. Among blood donors, the prevalence of HBsAg was 1.25% and among some high-risk groups includes contacts were 0.97%, midwife 0.64%, non-urgent operation was 0.63%, pregnant women were 0.46%, health worker was 0.28%. The highest prevalence of HBsAg 12.39% is recorded among routinely screened population and low among high-risk groups.

Mahmoud (2013), assess the prevalence of HBV among patients attending AL-Ramadi Hospital. This study includes 294 serum samples. Two well-known serological methods for detecting HBsAg were used, i.e. Health mate and HBsAg ELISA kits. It has been found that 96 serum samples were positive (32.7%) for HBsAg while 198 serum samples were negative (67.4%). HBsAg was higher in males (40.8%) than females (26.6%) in the age group of 21-30 years. HBV is prevalent in the age group of less than 20 years (32.7%) while it is least in the age group > 60 years (4.4%).

Al-Jumaily *et al.*, (2013), describe the significance of anti-HBs alone in some high-risk groups, their comparison and relationship with age and other factors related to serological marker positivity. A cross-sectional study was carried out in Al-Ramadi city, Al-Anbar province, western Iraq, from January 2011 to July 2012. Anti-HBs screening was conducted on blood samples that were collected from five vulnerable or risk groups,

including hemodialysis patients, barbers, family contacts to a known hepatitis B patient, coppers and health care workers (HCWs). Analysis was carried out using the Epi Info 7 software. A total of 789 subjects were screened. Among these, 294 are reactive to anti-HBs alone. Most of the groups studied showed higher rates of findings with high statistical significance. In concern to age, the high rate (45.5%) for positive testing for anti-HBs alone was observed at  $\leq 19$  years of age. Other age groups had lower rates ranging from (25.4-40.1%). Males showed higher positivity rate (38.7%) than females (33.8%). However, the positive history of jaundice in the past showed a lower rate (15.1%) than the negative history (40.9%), regarding anti-HBs positive alone with high significance ( $p < 0.001$ ). The vaccinated group showed the highest positivity for anti-HBs alone (55.8%) and the difference was statistically significant ( $p < 0.001$ ). Also, unknown vaccination history status showed lower rate (31.1%) of high statistical significance ( $p < 0.001$ ). For the number of vaccines versus seropositivity of anti-HBs alone, the highest rate (65.03%) was reported among those with 3 doses followed by those with 2 doses and 1 dose (60 and 15.2%, respectively) with statistically significant ( $p$ -value  $< 0.001$ ). In concern to the duration of the last dose effect on the seropositivity of anti-HBs alone, the last dose duration between 1 and 5 years showed the highest rate (57.89%), whereas those with duration of less than one year were slightly lower (56.89%). On the other hand, those with duration of more than 5 years were rated (39.02%) and the difference was statistically significant ( $p = 0.03$ ).

Al-Saad *et al.*, (2009), highlight the prevalence of HBV and HCV among Ramadi general hospital medical and non-medical staff, as well as preventing further transmission of these viruses. This study included 422 healthcare workers, of these 34 are female and 388 are male and 419 are Iraqi and only 3 are Egyptian. Collected sera samples were screened for HBV and HCV by ELISA. The prevalence of HBV among hospital workers was 4 out of 422 (0.94%) which was significantly higher than in control (0.2%), also the prevalence of HCV among hospital workers was 3 out of 422 (0.71%) which was significantly higher than in control, no females were positive in both estimates. All HCV positive cases are of Egyptian nationality. A relatively high rate of positivity was found among hospital workers compared to control.

Hasan (2012), determines the rate of occult HBV infection among unpaid blood donors in Diyala province-Iraq. This study was conducted from May 2011 to April 2012. A total of 186 unpaid blood donors from those attending the Central Blood Bank in Diyala province were selected by simple random selection. 171 (91.9%) were male and 15 (8.1%) were female. The age range was 19 to 60 years. Sera of blood donors were subjected to HBsAg screening test, anti-HBs antibody, anti-HBc IgM antibody by ELISA, as well as detection of HBV DNA

by conventional PCR technique. Data were statistically analyzed. The positivity rate of HBsAg, anti-HBc IgM and HBV DNA were 4.3%, 3.2% and 8.1%, respectively. Among the HBsAg negative blood donors, the HBc IgM positivity rate was 3.4% and the HBV DNA was detected in 3.9% (occult HBV).

In another study, Hasan *et al.*, (2018), examined the efficacy of HBcAbs versus HBsAg seromarkers in reducing the residual risk of occult hepatitis B infection by blood transfusion in Diyala Province. This follow-up study was conducted from January 2016 and August 2017. The results of HBsAg and HBcAbs as blood units screening seromarkers have been followed. Simple statistical analysis was performed using SPSS Version 18 and P value was considered to be significant wherever it is below 0.05. The total number of blood units donated during the follow-up period was 47258. The total HBV positive was 2423 (5.12%), of which 213 (0.45%) were HBsAg positive and 2210 (4.67%) were HBcAb (total) positive. Overall, 2369 (5.012%) blood donors were positive for both markers. All 213 HBsAg positive blood donors recorded throughout the two years (2016-2017) were male. Whereas 2145 (99.48%) and 11 (0.51%) blood donors are HBcAb positive were male and female respectively. Cumulatively, 2358 (99.53%) males and 11 (0.46 %) females were positive for both HBV markers.

Muhsin and Abdul-Husin (2013), assess the status of hepatitis B and C in thalassemia and haemophilic patients. From November (2011) to June (2012), 60 haemophilic and 56 thalassemic patients are randomly selected from the Governorate of Babylon – Iraq. A total of (116) blood samples (71 were male and 45 were female) were collected with a mean age of ( $24.5 \pm 7.1$  years) and tested for anti-HBsAg and anti-HCV IgG antibody by ELISA. The anti-HBsAg reactivity was verified by ELFA that is carried out in the automated VIDAS system while the anti-HCV reactivity was verified by Cobas apparatus and the viral load was calculated using RT-PCR. No anti-HBs Ag seropositive cases in both haemophilia and thalassemia groups found in this study while the ratio of anti-HCV Ab seropositivity cases in hemophilia patients was (6.67%) among them (10.52%) were infected males while (4.5%) were infected females. In thalassemia, the anti-HCV prevalence was (25%) among them (27.27%) were males while (26.0%) were females. There is a higher rate of HCV infections in rural areas than in urban areas. More incidences of HCV found in people with low economic status, low educational level, and more in smokers than in nonsmokers. The results of RT-PCR and ELISA were not compatible with (anti-HCV IgG).

Al-Marzoqi *et al.*, (2015), describe genetic single nucleotide polymorphisms in human and risk factors of HCV among the general population and blood donors. Blood samples were collected from 248 patients and 70 normal subjects as a control group. Among them, 47.2% are males and 52.8% are females. Blood samples from

248 patients were tested for HBsAg by ELISA and PCR. In addition, some genes were used to study the prevalence of hepatitis severity with human gene polymorphism like IFNGR, IFN- $\gamma$  and IL-28B gene. The characteristics of the 248 patients included in the study are age, residence type, risk factor and gender. Polymorphisms in patients with HBV showed the existence of polymorphism in the IFNGR gene at chromosome 6 in position 137219896+137219995 among 47% of patients compared with control 21%. Study of HBV in a healthy group against other test genes revealed a marked significance in the IFN- $\gamma$  genes. There was a strong association of the IFN- $\gamma$  at chr12:68158673-68158792 with HBV compared to controls 61.4% and 27.08% respectively. Gene expression profile with IL28B Genotype showed that (19.6%) patients with CC genotype, (71.6%) with CT (patients) and patients (8.8%) with TT genotype among chronic viral hepatitis B patients.

Al-Sharifi *et al.*, (2019), evaluate the prevalence of hepatitis B and C viruses in thalassemic patients and their association with the type of thalassemia, blood transfusion, and spleen status. A cross-sectional study was conducted on 100 multitransfused thalassemic patients from November 1, 2016 to January 1, 2017. VIDAS method is used to detect HBsAg, HBcAb IgG and IgM for screening of hepatitis B virus (HBV), anti-HCV antibody and RT-PCR for hepatitis C virus (HCV) was done. There is no family history of HBV and HCV infection or history of vaccination of the patients studied. Twelve (12%) patients had HBcAb positive, while 3 (3%) had HBsAg positivity, higher percentage of HCV-infected patients (91%) received regular blood transfusion every 1 month., 50% of hepatitis C patients had splenomegaly, and 20.7% had a splenectomy.

Al-Suraifi *et al.*, (2016), detect genotypes of HBV among Iraqi patients with hepatitis type B using nested PCR protocol in Wasit Province, Iraq. This study included a total of 105 outpatients (65 males and 40 females, aged 1-95 years) clinically suspected of having viral hepatitis. Sera of all 105 samples were positive for HBsAg by ELISA screen test. Whereas 72 (60.5%) and 33 (31.4%) of these samples were positive and negative for HBV DNA, respectively, by first PCR. Survey of positive DNA samples for HBV genotypes by nested PCR (second PCR) showed unique results that no single genotype was found and all of these samples had mixed genotypes with pattern A+B+C+D+E were the most common (77.7%), followed by A+B+D+E (16.66%), A+B+C (2.77%), A+B+E (1.38%), and A+D+E (1.38%), whereas genotype F has not been found in any patient. Statistically, there was non-significant difference in genotype distribution between males and females. The presence of mixed infection with about 5 HBV genotypes in most patients results in different infection sources at different times and required an epidemiological evaluation of HBV infection.

Al-Zubaidi (2019), test 88 blood samples (45 were male and 43 were female aged 15-82 years) for the detection of serological markers using ELISA and PCR technique for positive HBsAg. Regarding population group (HBsAg) positive, the seroprevalence rate of HBsAg, anti-HBs, anti-HBc IgM, anti-HBc Total, HBeAg, anti-HBe and HBV DNA were 25%, 5%, 12%, 10%, 9%, 17% and 22% respectively. Stages of the disease such as chronic HBV (36.36%), acute HBV (25%), incubation period (17.07%), recovery stage (15.90%), window stage (2.27%), false positive (2.27%) and carrier stage (1.13%) were determined by the HBeAg, anti-HBe and ALT test.

Kadhem *et al.*, (2019), estimate the prevalence of viral hepatitis A, B and C infections and assess the incidence of these infections among the community categories, depending on gender, residence place and age groups. Data of 1548 positive cases of viral hepatitis A, B and C infections were collected from the Central Public Health laboratory of Misan Province from January 2013 to December 2017. HAV was found to be the most predominant type, accounting for 71.4% of the cases, followed by HBV 18.6% and HCV 10%. Males were the most affected by all viral hepatitis infections by 54.47%, 84.03% and 55.48% for HAV, HBV and HCV respectively. Patients residing in the city were the most affected by viral hepatitis infections by 75.93%, 57.64% and 64.52% for HAV, HBV and HCV respectively. HAV infections predominate in patients less than 14 years of age with 95.11% of viral hepatitis cases, while HBV and HCV most affect the age group between (25-50) years with 61.11% and 45.81% of viral hepatitis cases respectively.

Hussein *et al.*, (2019), investigate the number of cases of hepatitis virus infection in local and incoming people to the public health laboratory in DhiQar Governorate from January 2016 to December 2016. ELISA technique was used to detect HBsAg, anti-HBc and anti-HBs in serum specimens. Out of 4697 people, 60 (1.27%) were seropositive to HBsAg. In December 2016 a higher percentage (3.08%) of people with HBV recorded while the lowest percentage (0.20%) was recorded in August. HBV infections were more in male [39 (65%)] than in female [21 (35%)]. The percentage of locals infected with HBV was higher (1.6%) than that of incoming people (0.6%). Higher number and percentage [16 (26.7%)] of people infected with HBV in the 31-40 age group and 1-10 years age group has lowest percentage [1 (1.7%)].

Al-Rubaye *et al.*, (2016), investigate the prevalence of HBV and HCV seromarkers among blood donors in Basra as the basis for safe blood transfusion. A cross-sectional study was carried out from 1 January to 31 December 2013 at the blood banks in Basra, Iraq. Blood samples were collected and were tested for HBsAg, anti-HBc and anti-HCV by ELISA and statistical analysis was carried out using SPSS software. A total of 69915 blood

donors (69658 males and 257 females) ages ranged from 18-70 years were enrolled for the study. A total of 1625 (2.3%) donors showed serological evidence of HBV infection; of those donors, 125 (0.2%) showed positive results for both anti-HBc and HBsAg while 1475 (2.1%) had positive results for anti-HBc. There was no significant difference between males and females ( $p=0.28$ ). The prevalence of anti-HCV has been reported in 87 (0.1%) blood donors.

Al-Asadi and Abdul-Jalil (2016), find out the seroprevalence of viral hepatitis B and C in pre-surgical patients admitted to Basrah General Hospital for elective surgery. A cross-sectional study was carried out from April 2014 to March 2015. Participants selected for the study are over 18 years of age. Demographic and medical information was collected. Blood samples for HBsAg and HCV antibodies were tested by ELISA. Out of 254 patients (mean age  $45.7 \pm 16.8$  years), 63% were males, and 15 (5.9%) were seropositive for HBsAg, while 7 (2.8%) were seropositive for anti-HCV. None were simultaneously positive for both hepatitis B and C. The overall seroprevalence of either hepatitis B or C was 8.7%. Significant risk factors for viral hepatitis seropositivity were identified in the multivariate analysis. History of dental surgical intervention (OR, 12.84; 95% CI, 1.60-24.69;  $P=0.018$ ), number of blood transfusions (OR, 2.39; 95% CI, 1.07-4.96;  $P=0.033$ ), and tattooing (OR, 4.59; 95% CI, 1.09-7.33;  $P=0.037$ ).

### Conflict of interest

The author declares no conflict of interest.

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