

Seroprevalence and risk factors of hepatitis B and C viruses among diabetes mellitus patients in Duhok province, Iraqi Kurdistan

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ABSTRACT

Context: Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are major public health issues as they may progress into chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma (HCC). **Aims:** to identify the prevalence and risk factors of HBV and HCV among diabetic patients in Duhok province. **Patients and Methods:** It is a prospective study conducted in Shilan private hospital from June 2016 until December 2018. The serum of all diabetic patients was investigated by Enzyme-linked Immunosorbent Assay (ELISA) to detect HBsAg and anti-HCV. Diabetes mellitus (DM) was diagnosed according to American Diabetes Association (ADA). The results were analyzed by entering the data in Statistical Package for the Social Sciences (SPSS). **Results:** Three hundred seventy five DM patients were included in this study. The mean age of the patients was 54.38 ± 9.23 , and the majority was female patients (65.87%). Out of 375 patients, 8 cases (2.13%) were HBV and 2 cases (0.53%) were HCV. Considering risk factors associated with HBV and HCV infections among diabetic patients, alcoholism was associated with both infections. Hemodialysis was a risk factor for HCV infection among diabetic patients but it was not associated with HBV. **Conclusions:** Although prevalence of HBV and HCV is higher among diabetic patients, its prevalence is low in comparison to other studies. It is recommended to screen HBsAg and anti-HCV in all alcoholic diabetic patients. Hemodialysis remains a significant risk factor for HCV transmission among diabetic patients with end stage renal disease (ESRD).

Keywords: Diabetes mellitus, HBV, HCV, risk factors, seroprevalence

Introduction

Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are major public health issues as they may progress into chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma (HCC).^[1] HBV infects around one-third of the world population, with 257 million patients chronically infected.^[2] On the other hand, chronic HCV infects approximately 1.0% of the world, which is estimated to be 71 million individuals.^[2] In different parts of

the world, hepatitis B and C viruses show great variation in their prevalence. In the Eastern Mediterranean Region the prevalence of HBV infection is 3.3%; whereas, the prevalence of HCV infection ranges from 1% to 2% excluding Egypt, where the prevalence rate is greater.^[1,3] In Iraq, a prevalence rate of 1.6% and 0.4% for HBV and HCV was reported, respectively.^[4]

Generally, viral infections can have a great role in the pathogenesis of Diabetes Mellitus (DM). The exact mechanism of HBV and HCV in the pathogenesis of DM is not well understood. Several studies found an association between insulin resistance and parenteral viral hepatitis, specially more prominent with HCV infection.^[5] Patients with DM have a higher risk of acquiring hepatitis B and C viruses because they are more exposed

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to medical interventions and are frequently hospitalized.^[6] Risk factors such as blood transfusions, dental interventions, hemodialysis, alcohol consumption, etc., are directly implicated to an increasing prevalence of HBV and HCV infections in diabetic patients.^[7-10] Outbreaks of HBV infections were reported among DM patients who have had shared blood glucose devices. This could be linked to the low level of education regarding high risk of hepatitis B and C viruses' transmission during finger stick testing.^[11]

Patients with DM are more prone to chronic liver diseases such as non-alcoholic steatohepatitis (NASH).^[12] Several studies have shown synergistic effects of parenteral viral hepatitis with DM in the advancement of chronic liver diseases.^[13,14] Although, this synergistic effect is very important, there is no data about the rate and risk factors of hepatitis B and C infections among diabetic patients in this region. Therefore, this study has aimed to identify the prevalence and risk factors of HBV and HCV among diabetic patients in Duhok province.

Patients and Methods

Setting

Shilan Hospital is a recognized private hospital, which provides medical and surgical services mainly for Duhok and neighboring cities. It has an additional attachment for consultation clinics of out-patients' management such as clinics of infectious diseases, diabetes, pediatrics, gynecology, general surgery, etc.

Study design and patients

This is a prospective study that included all DM patients who accepted to participate in a blood test for hepatitis B surface antigen (HBsAg) and anti-hepatitis C virus (anti-HCV) detection. All of included patients attending the clinic between June 2016 and December 2018 were interviewed. Type 2 DM patients were the only ones included. Exclusion criteria were as follows: type 1 and gestational DM, other causes of viral hepatitis e.g. cytomegalovirus (CMV) infection and other types of hepatitis e.g. autoimmune hepatitis. The patients' demographic profiles and certain risk factors related to HBV and HCV associated with DM were assessed.

Laboratory investigations

Blood samples were collected from the patients. Each sample consisting of 5 ml were obtained from the antecubital vein by a sterile disposable syringe. The blood was poured into a clean plain tube without anticoagulant and centrifuged at 3000 rpm for 5 minutes. The serum was investigated by Enzyme-linked Immunosorbent Assay (ELISA) to detect HBsAg, and anti-HCV (Fortress Diagnostics Limited, Antrim, United Kingdom) according to the manufacturer instructions.^[15] Furthermore, fasting plasma glucose and random glycemia was performed using Cobas c 311/Cobas c 6000, and glycosylated hemoglobin (HbA1c) using Cobas c 311.

Definitions

HBV and HCV were defined based on the presence of HBsAg and anti-HCV in the serum of the patients, respectively. Diabetes mellitus was diagnosed according to American Diabetes Association (ADA).^[16]

Statistical analysis

The results obtained were analyzed by entering the data in Statistical Package for the Social Sciences (SPSS), version 16; SPSS Inc., Chicago, Illinois, USA. A P value ≤ 0.05 was considered statistically significant.

Ethical approval

This study was approved by the ethical committee of College of Pharmacy, University of Duhok. A written consent was obtained from all patients participating in this study.

Results

The demographic and clinical profile of the 375 documented DM patients is shown in Table 1. The mean age of the patients was 54.38 ± 9.23 , and the majority was female patients (65.87%).

The prevalence of the infections among diabetic patients is shown in Table 2. There were 8 patients with HBV and 2 with HCV.

Considering risk factors associated with HBV and HCV infections among diabetic patients, alcoholism was associated with both infections. Hemodialysis was a risk factor for HCV infection among diabetic patients, but it was not associated with HBV. There were no other significant associations of variables between HBV and HCV among the study population [Table 3].

Discussion

To the best of my knowledge this is the first study aimed to identify prevalence and certain risk factors associated with HBV and HCV infections in Duhok, Kurdistan region.

The prevalence of HBV and HCV was 2.13, and 0.53, respectively, which is relatively higher than that of previous recorded studies among non-diabetic people in this region.^[4,17-19] This can be justified by the numerous use of finger stick measurement of blood sugar and also due to frequent hospital admission of such patients. Furthermore, diabetic patients, particularly those with a long duration and poor glycemic control have a reduced immunity; hence they are more prone to develop chronic HBV infection. Worldwide, several studies generalized a higher prevalence rate of such viruses among diabetic patients.^[20-22] Considering seroprevalence of HCV, most literatures reported its prominence correlation with DM; hence, noting a higher prevalence of HCV among diabetic patients.^[6,22-29] Contrarily, the seroprevalences of HBV among diabetics and non-diabetics is controversial in the existing literatures. A number of studies,

similar to this study, reported higher prevalence rates of HBV infection among diabetics,^[30-32] whereas, others did not find a variation.^[25,33-35] The prevalence of HBV in DM patients in this study was lower than those reported from Turkey (3.8%),^[33] China (13.5%),^[34] Nigeria,^[36] and Ghana (5.5%).^[31] Likewise, the prevalence of HCV in diabetic patients was also lower compared

to studies from Turkey (3.3%),^[33] Iran (1.98%),^[28] China (6.8%),^[34] and Ethiopia (7.5%).^[6] Overall, the low prevalence rate of the infections, particularly HCV, among diabetics in this study is directly related to a low prevalence rate of these viruses in the general population of Duhok province.^[17,19]

In the current study, there were certain risk factors significantly associated with HBV and HCV infections in diabetic patients. Alcoholism was one of the predictors of these infections. In agreement, a study from Turkey found that the prevalence of both infections was higher among alcoholic cirrhotic patients.^[7]

Although many studies found a high prevalence of HCV among alcoholic patients, the same for HBV was not reported.^[35,37] As a matter of fact, several literatures documented a high prevalence of HCV infection among alcoholic people.^[8,9] This can be elucidated as a result of parenteral risk factors for the acquisition of HCV infection. On the contrary, few studies claimed that alcohol has a critical role in risky sexual behavior, which leads to acquiring sexually transmitted diseases (STD) such as HBV infection.^[6,38]

Synergistic effects between alcoholic DM patients with HBV and/or HCV, which progress into liver diseases are common. As a result of high prevalence of these infections among alcoholic diabetic patients in this study, it is strongly recommended to screen HBV and HCV in such vulnerable groups.

Although, in the current study, parenteral risk factors of HBV and HCV among DM patients were not associated with an increasing risk of such viruses, hemodialysis was an exception. Hemodialysis was a predictor of HCV in diabetic patients, but not HBV. In concordance to this finding, in 2017, a study was conducted in hemodialysis center of Duhok on 94 patients with end stage

Table 1: Clinico-demographic profile of the patients (Total patients=375)

Variable	No.	Percentage
Age year (mean±SD)		54.38±9.23
Sex	Male	128 34.13
	Female	247 65.87
Smoker	Yes	54 14.40
	No	321 85.60
Alcoholic	Yes	9 2.40
	No	366 97.60
Surgical intervention	Yes	237 63.20
	No	138 36.80
Dental intervention	Yes	269 69.07
	No	96 25.60
Blood transfusion	Yes	67 17.87
	No	308 82.13
Hemodialysis	Yes	9 2.40
	No	366 97.60
Immunosuppressive therapy	Yes	13 3.47
	No	362 96.53

Table 2: Seroprevalence of hepatitis B and C infections among diabetes patients (total patients=375)

Type of infection	Number	Percent
HBV ¹ (HBsAg positive)	8	2.13
HCV ² (Anti-HCV positive)	2	0.53

1-HBV: hepatitis B virus. 2-HCV: hepatitis C virus

Table 3: Risk factors related to hepatitis B and C infections among diabetic patients

Variable	Total	HBV status		P	HCV status		P	
		Positive No (%)	Negative No (%)		Positive No (%)	Negative No (%)		
Age	<40	31	1 (3.23)	30 (96.77)	0.502	1 (3.23)	30 (96.77)	0.159
	≥40	344	7 (2.03)	337 (97.97)		1 (0.29)	343 (99.71)	
Sex	Male	128	4 (3.13)	124 (96.88)	0.453	1 (0.78)	127 (99.22)	1.000
	Female	247	4 (1.62)	243 (98.38)		1 (0.40)	246 (99.60)	
Smoker	Yes	54	2 (3.70)	52 (96.30)	0.324	0 (0.0)	54 (100.00)	1,000
	No	321	6 (1.87)	315 (98.13)		2 (0.62)	319 (99.38)	
Alcoholic	Yes	9	2 (22.22)	7 (77.78)	0.013	1 (11.11)	8 (88.89)	0.047
	No	366	6 (1.64)	360 (98.36)		1 (0.27)	365 (99.73)	
Surgical procedures	Yes	237	3 (1.27)	234 (98.73)	0.126	1 (0.42)	236 (99.58)	1.000
	No	138	5 (3.62)	133 (96.38)		1 (0.72)	137 (99.28)	
Dental Procedures	Yes	274	7 (2.83)	267 (108.10)	0.688	1 (0.36)	273 (99.64)	0.467
	No	101	1 (0.99)	100 (99.01)		1 (0.99)	100 (99.01)	
Blood transfusion	Yes	67	2 (2.99)	65 (97.01)	0.637	1 (1.49)	66 (98.51)	0.326
	No	308	6 (1.95)	302 (98.05)		1 (0.32)	307 (99.68)	
Hemodialysis	Yes	9	1 (11.11)	8 (88.89)	0.059	1 (11.11)	8 (88.89)	0.047
	No	366	7 (1.91)	359 (98.09)		1 (0.27)	365 (99.73)	
Immunosuppressive therapy	Yes	13	1 (7.69)	12 (92.31)	0.248	0 (0.0)	13 (100.00)	1.000
	No	362	7 (1.93)	355 (98.07)		2 (0.55)	360 (99.45)	

renal disease (ESRD), the prevalence of HBV was 3.2%; whereas, the prevalence of HCV was 7.4%.^[39] Apparently, the lower prevalence rate of HBV in dialysis patients can be analyzed by the strong recommendation of universal HBV vaccination of hemodialysis patients. The high prevalence rate of HCV among dialysis patients in this study can be deduced by unavailability of HCV vaccine and inadequate infection control measures in the dialysis unit in Duhok. Furthermore, chronic HCV by itself may be a risk factor of ESRD requiring hemodialysis.^[10,40] Generally, in Duhok health care facilities a routine pre-blood transfusion and pre-surgical operation screening of HBV and HCV is compulsory, which averts these risk factors. Although routine pre-dental interventions are not obligatory in Duhok, dental procedures were not a significant risk factor in this study. However, in a previous study from Duhok, dental intervention was significantly associated with an increased risk of HBV infection among tuberculosis patients.^[18]

Overall, this study can be used as an evidence base for primary care practice for testing HBsAg and anti-HCV in diabetic patients; and vaccinating those who are negative for HBV, to improve health outcomes among diabetic patients in Duhok health facilities.

There are a few limitations in this study. The duration of DM was not considered as it might increase the risk of acquiring HBV and HCV infections. The consumption of alcohol by diabetic patients may be biased due to socio-religious barrier in the society. Hence, the reported rate may be lower than the figure presented. HCV-RNA (RT-PCR) was not performed on positive anti-HCV patients so past infections were not excluded, if there were any.

In conclusion, although prevalence of HBV and HCV is higher among diabetic patients, its prevalence is low in comparison to other studies. It is recommended to screen HBsAg and anti-HCV in all alcoholic diabetic patients. Hemodialysis remains a significant risk factor for HCV transmission among diabetic patients with ESRD.

Further prospective case control studies with larger sample sizes including more risk factors are warranted to better understand the prevalence and associated factors with parenteral viral hepatitis among diabetic patients.

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Declaration of patient consent

The author certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other

clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest

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