

Original article

# Prevalence of Hepatitis B, C and HIV in Libyan Children and Adolescents with Type 1 Diabetes: Tripoli University Hospital's experience

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## Abstract

They are few publications concerning the prevalence of the 3 blood borne viruses, Hepatitis B (HBV), Hepatitis C (HCV), and Human Immunodeficiency Virus (HIV) among children and adolescents with type 1 diabetes (T1D), who are receiving multiple daily injection of insulin, those special group of patients are in contact with health facilities, and health professionals. They are repeatedly subjected for blood tests and hospital admission every now and then. 2100 children & adolescents with T1D were screened for HBV, HCV, and HIV, there were further studied for history of hospitalization, surgical or dental intervention, blood transfusion, family and social backgrounds were looked at as well. Out of 2100 children & adolescents, 25 were found sero-positive by ELISA, of whom 17 were confirmed by PCR, 15 patients were positive for HCV, and 2 patients for HBV, and none for HIV. This study concluded that there is a very low incidence of hepatitis B virus, and this is mainly due to the fact that nearly all children were vaccinated against hepatitis B [hepatitis B vaccine started since 1988 in Libya], while the incidence of hepatitis C is less than that in the Libyan general population, and we are so pleased to report that none was positive for HIV in this cohort.

**Keywords:** Hepatitis, Infections, Children, Adolescents, T1D.

## Introduction

Hepatitis B, C viruses & HIV infections are major public health problems affecting millions of people globally, and causing a significant disease burden worldwide, they are warranting major efforts for prevention, control and treatment [1,2]. The infections that caused by these three viruses are not easily curable even with the latest available medications, however effective vaccine is available for HBV only [3]. In children, acute infection is more common with hepatitis B than with hepatitis C & HIV; but chronic asymptomatic infection leading to chronic liver disease and hepatocellular carcinoma is a considerable concern [4]. The natural history of hepatitis B is well established in adults, but the long-term outcome for children is still under debate. The main source of infection in childhood is perinatal transmission, which is effectively prevented using vaccination, antenatal screening and screening of blood products and organ donors. The vaccine is effective in 97% of newborn infants and lasts for at least 15 years [4]. In Hepatitis C virus, the main route of transmission was originally through infected blood products or organs; but now the most common source is vertical transmission which ranges from 2%-12% depending on maternal infectivity. Breast feeding is safe in mothers with low titers of hepatitis C RNA [4]. The natural spontaneous clearance rate for hepatitis C is between 20% to 40% and is higher in children who have been parenterally infected compared to perinatal infection. It is a mild disease in children, but the indication for treatment is based on the future risk of cirrhosis and hepatocellular cancer [4].

As for HIV infection in children, worldwide an estimated 34 million people are living with HIV infection; 3.4 million (approximately 10%) are younger than 15 years [5]. Nearly all (95%) children younger than 15 years acquired HIV infection perinatally [5]. Sexual transmission is an important mode of transmission for adolescents, Less common routes of transmission include transfusion with blood products infected with HIV [6]. Health worker professional in the field of diabetes such as diabetic nurses and educators should provide their patients with information and advices on how to protect themselves from getting hepatitis

virus & HIV infections. People living with diabetes are at increased risk for hepatitis B, C, & HIV infection, if they share blood glucose meters, finger stick devices or other diabetes-care equipments such as syringes or insulin pens [7]. Children & adolescents with type 1 diabetes receiving multiple daily insulin injections, since diagnosis, they were in contact with health vicinity, and health professionals, they get repeated blood tests, and subjected to hospital admissions every now and then.

There are few data on the prevalence of HBV, HCV, HIV infections in children & adolescents with T1D. Up to our knowledge, our study is the 1st study in this country aiming to look at the prevalence of HBV, HCV, & HIV infections in this special group of children & adolescents, and to identify risk factors behind.

### Methods

This sero-epidemiological study was carried out in the period between [2010-2016], included 2100 children and adolescents with T1D, who were diagnosed and followed up at the Pediatric Endocrine & Diabetes Department, Tripoli University Hospital. The inclusion criteria were patients with definite diagnosis of T1D according to the criteria of American Diabetes Association (ADA) [8], age range between 1-18 years, and duration of disease of > 6 months. However, the exclusion criteria were past history of hepatitis before diagnosis of diabetes and diabetic children or adolescents with abnormal lipid profile.

A standardized questionnaire was used to collect socio-demographic data such as age, gender, medical history including history of exposure to common risk factors associated with HBV, HCV & HIV transmission based on those established in previous studies in the literature, in addition to some factors that are peculiar to our community e.g. circumcision. Risk factors for exposure to the viruses included transfusion(s) of blood or blood products; surgical procedures e.g., (operations, dental procedures, stitches, abscess drainage), family history of HBV, HCV & HIV positive members, and the vaccine status for Hepatitis B. Thorough clinical examination including body weight, height and BMI. Hepatic assessment included clinical examination, laboratory investigations, and abdominal ultrasonography.

Regarding the laboratory investigations, initially children & adolescents were screened for HBV, HCV & HIV by using ELISA and those who were found positive were further confirmed by PCR. Complete liver biochemical profile also taken for the positive cases.

### Results

About 2100 diabetic children & adolescents with T1D were screened for HBV, HCV & HIV. The mean age of the cases was 10 years, ranged [1-18 years]. About 1063 females (50.4%) and 1037 males (49.6%), mean duration of diabetes 8.8 years ranged [1-15 years], 1302 patients (62%) living in Tripoli, while the rest from different parts of Libya (Table 1 & 2).

**Table 1 sex distribution**

Sex	number	%
Male	1037	49,6
Female	1063	50,4
Total	2100	100

**Table 2 patient residency**

Residency	Number	%
Tripoli	1302	62
Outside Tripoli	798	38
Total	2100	100

Approximately, 25 out of 2100 patients were sero-positive for hepatitis B, and C by Enzyme-linked immune-sorbent assay (ELISA). 17 cases out of 25 confirmed by polymerase chain reaction (PCR) to have HBV and HCV. 2 patients were hepatitis B positive antigen, and the remaining 15 cases were hepatitis C positive (Table 3).

**Table 3 PCR result of seropositive patients**

Seropositive patients	No. of patient	%
HBV	2	0.095
HCV	15	0.714
HIV	0	0

**Hepatitis B positive patients:**

The 1st patient was male aged 16 years who had past medical history of surgical intervention, The 2nd one was female patient aged 17 years old who had a history of dental intervention. Unfortunately, both of them were not vaccinated against hepatitis B vaccine. Both of them had no history of HBV, HCV or HIV infections in their family members, and none of them had hepatomegaly neither clinically nor on ultrasound. The female patient had significant raised level of liver enzymes (transaminases), and she got responded to the treatment (Table 4).

**Table 4 Hepatitis B positive patients**

HBV Patient	Sex	Age	HB Vaccine	Risk Factor	Family History
1	Male	16 Yrs	No	Surgery	No
1	Female	17 Yrs	No	Dental Procedure	No

**Hepatitis C positive patients**

15 patients were positive for HCV, their mean age was 11 years, ranged [4–17 years], 13 cases were females, and 2 were males. One of the boys was drug user, while one of the girls had history of blood transfusion. There was neither history of HCV nor HBV, HIV in their families. In addition to following these cases up at the endocrine & diabetes clinic, they referred to be followed up at infectious department clinic to receive treatment, especially the new treatments modality that have been proven to be effective in treating hepatitis C virus in children & adolescents, and some cases have been cured already (Table 3).

**HIV patients**

There were no HIV cases detected in this study.

**Discussion**

Libya is a developing country of approximately 7.0 million people, the prevalence rates in our general population of HbsAg, Anti-HCV, Anti-HIV were found to be 2.2%, 1.2%, and 0.13%, respectively [1,2]. These are corresponding to approximately 120.000 HbsAg-positive persons, 67.000 Anti-HCV positive persons, and 8000 anti-HIV positive persons in Libya [9-12]. Hepatitis B vaccine was introduced to our national Libyan immunization program January 1993, where all newborn in Libya were offered HBV vaccine, and with catch up immunization we went back to include all those who were born since January, 1988 (in other ward all those born in Libya since 1988 were immunized).

The current study was the 1<sup>st</sup> study carried out in Libya, looking at the prevalence of HBV, HCV, & HIV infections in children & adolescents with T1D. The previous studies in this country were focused on health care workers, blood donors and general population. Elzouki & et al [2,9-10]. A well designed and conducted studies on the general population, has found, the prevalence of hepatitis B surface antigen (HbsAg), anti HCV, and HIV in Libya to be 2.2%, 1.2% and 0.13% respectively.

In the present study HBV was very low, two positive cases out of 2100 patients studied, these two patients were not immunized, both had had surgical procedures and we are pleased to report that both were treated, and responded well to hepatitis B treatment. There were 15 patients positive for HCV, and although they were more HCV patients than HBV, however HCV remains well below the prevalence of HCV in the general population. No cases of HIV were reported in this study.

Few publications concerning the prevalence of the 3 blood borne viruses (HBV, HCV, and HIV) among children & adolescents with T1D. One of them, a study carried out in Upper Egypt evaluated the epidemiology and risk factors of hepatitis C virus infection in Egyptian children with T1DM [13], They found that the frequency of HCV infection in children with T1DM appears to be high and is mainly related to residence in rural area, or low socio-

economic class, these children did not have their own glucometer, they used to check their blood sugar by a common use glucometer in pharmacies which can lead to cross HCV infection. Kandil. M et al [14] revealed in their study which done on some high-risk groups of Egyptian children, including a group with type 1 diabetes (T1D), group with chronic renal failure (CRF) on regular hemodialysis, patients with systemic lupus erythematosus (SLE) and group of control healthy children, a significantly high anti-HCV sero-prevalence in children with T1D, CRF and SLE. The increased anti-HCV sero-prevalence in patients with T1D suggested that multiple daily injections play an important role, in addition to possibility of patient- to-patient transmission during hospital admission or during attending the outpatient clinics with wrong handling of same finger stick device.

Another study done in Kutahya, Turkey looked for the prevalence of hepatitis B and C viruses among Turkish patients with diabetes, and to determine the risk factors behind [15]. The study determined that hepatitis B virus and hepatitis C virus infections were slightly but not significantly higher in diabetic patients compared with a normal population. History of blood transfusion and surgical procedures were found to be associate with anti-HCV seropositivity

### Conclusion

There was a low incidence of hepatitis B in this cohort of Libyan diabetic children and adolescents, and this is mainly due to the fact that most of these children were vaccinated against hepatitis B according to the Libyan Expanded Program of Immunization. While the incidence of HCV in the present study was more than in HBV, but it was less than that found in the general Libyan population, this is partly due to parental education and awareness, as well as the safe use of injections. However, no HIV cases were detected in this cohort.

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