

Epidemiological Study of Hepatitis B, C and HIV Cases among the Foreigners Visiting Sulaimani City from 2013 Through 2016

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Abstract

Hepatitis B, C and HIV infections present a great public health problem worldwide. More than 350 million of world's populations have chronic HBV infection and near 1 million people are dying due to this infection each year. About 150-200 million of world's population have chronic HCV infection that leads to nearly 350 000 deaths annually. On the other hand HIV remains as a major global public health issue. In 2015, about 36.7 million people were living with HIV and 1.1 million people died of HIV related illnesses.

To find the prevalence of HB, HCV and HIV infection among the foreigners who visited Sulaimani city in 2013 through 2016 and evaluate the common risk factors in those who had a positive results in 2016. This study was conducted between 1st of January 2016 and 31st December 2016. A total number of 275,979 foreigners who were referred formally to the central laboratory- residency department in Sulaimani city for screening for (HBsAg, HCV Ab and HIV Ab) from 2013 through 2016 were analyzed and all the foreigners who visited Sulaimani city in 2016 were included with

assessment of demographic data and risk factors among the positive cases.

Among 275,979 foreigners who visited Sulaimani city from 2013 through 2016, the overall prevalence of HBV infection was 0.47% (1318 cases), HCV 0.01 % (267 cases) and HIV 0.01 % (30 cases). In 2016 the highest prevalence of HBV infection was among Syrians which was 2.5% while highest HCV prevalence was among Europeans 0.82%. Ages of the patients ranged between (18-65) years, 85.4% were males, 65.2% of males and 45.7% of females were married. Dental procedures, surgery, blood transfusion and family history were common risk factors.

HBV infection was highest among Syrian foreigners. While the highest HCV prevalence was among Europeans. An immediate action plan is needed to screen all Syrian refugees in our region for HBV, HCV and HIV to determine active infection and treat accordingly and also impose preventive measures to halt the spread of the infections.

Keywords: Hepatitis B, Hepatitis C, HIV, Prevalence, Foreigners, Sulaimani

1. INTRODUCTION

Hepatitis B is a potentially life-threatening liver infection. It is a global health problem. It can cause acute and chronic infection and puts people at high risk of death from cirrhosis and liver cancer. It is 50-100 folds more infectious than human immunodeficiency virus (HIV) and 10 folds more infectious than hepatitis C virus (HCV) [1]. An exposure to an infected source has a risk of acute infection up to 30%. Worldwide about two billion people have been infected with HBV and more than 350 million have chronic liver infection. About 500 000-1.2 million people pass away annually because of the acute or chronic hepatitis B [2].

HBV is a Hepadna virus, the virion consisting of a 42-nm spherical, double-shelled particle that invades the hepatocytes [3], [4].

The prevalence of chronic HBV infection varies greatly in different parts of the world. The world are divided into three regions where the prevalence of chronic HBV infection is high ($\geq 8\%$), intermediate (2-7 %), and low ($< 2\%$) [5].

According to the previous studies done in Sulaimani city the prevalence of HBV infection was 0.67% among the premarital couples in 2012 [6], 0.7% among 17182 patients who had screening with HBsAg preoperatively [7], and 0.78 % among 7900 blood donors in Duhok city [8] puts our region in a low endemicity area.

Transmission results from exposure to infectious blood or body fluids containing HBV [9]. The virus may be detected within 4-8 weeks after infection and can persist and leads to chronic hepatitis B. The incubation period of the HBV vary from 30 to 180 days [10].

The hepatitis B surface antigen (HBsAg) is most frequently used to screen for the presence of infection. It is the first detectable viral antigen to appear during infection [11].

Vaccines for the prevention of HBV are routinely recommended for infants since 1991 in the United States [12]. A protective response to the vaccine is defined as HBs antibody concentration of at least 10 MiU/ml in the recipient's serum [13].

Hepatitis C virus causes both acute and chronic infection. Acute HCV infection is usually asymptomatic. About 15–45% of infected persons spontaneously clear the virus within 6 months without any treatment. The remaining 55–85% of persons develops chronic HCV infection. In patients with chronic HCV infection, the risk of liver cirrhosis is between 15–30% within 20 years. About 3–4 million people are infected annually, and more than 350,000 people die annually from hepatitis C related diseases [14].

It is estimated that 150–200 million people are living with chronic hepatitis C [14], [15]. The infection rates have increased substantially in the 20th century due to intravenous drug abuse and reused but poorly sterilized medical instruments [16].

Countries with high rates of infection include Egypt (22%), Pakistan (4.8%) and China (3.2%) [14], the high prevalence in Egypt is due to a now-discontinued mass-treatment campaign for schistosomiasis using improperly sterilized glass syringes [16].

Several studies have been done in Kurdistan regarding the prevalence of HCV infection ,in Sulaimani city among 17182 patients who had screening with HCV Ab preoperatively the prevalence was 0.4 % [7] and in Duhok city among 7900 blood donors the prevalence was 0.2% [8] putting our region in a low endemicity area.

The human immunodeficiency virus is a Lentivirus that causes HIV infection and over time acquired immunodeficiency syndrome (AIDS) [17], [18]. AIDS is characterized by progressive failure of the immune system that causes life-threatening opportunistic infections and cancers, average survival time after infection with HIV without therapy is estimated to be 9 to 11 years, depending on the subtype of HIV [19].

Around 40% of people living with HIV do not know that they have the virus. Since 2010, the incidence of new infections among adults (15+) has remained static at 1.9 million [20].

Most of children live in Sub-Saharan Africa were infected via their HIV-positive mothers during pregnancy, childbirth or breastfeeding [21].

The specimens that are repeatedly reactive by ELISA and positive by IFA or reactive by western blot are considered HIV-positive and indicate HIV infection [22].

Aim of the study: to find out the prevalence of HBV, HCV and HIV infection among the foreigners visiting Sulaimani city formally since 2013 through 2016, and to assess the risk factors in those who visited Sulaimani city in 2016.

2. SUBJECTS AND METHODS

This study was performed between 1st of January 2016 and 31st of December 2016, all foreigners (visitors) who were referred formally to the central laboratory-Residency department in Sulaimani city for screening with (HBsAg , HCV Ab and HIV Ab) were included .

A questionnaire designed to collect demographic data in terms of age, sex, residency and risk factors for getting (HBV, HCV and HIV) infections like history of surgical and dental procedures and blood transfusion.

Study design: Composed of two parts:

- A. Retrospective study in which all the foreigners who were referred formally to the central laboratory-residency department in 2013, 2014 and 2015 were included.
- B. Prospective study in which all the foreigners who were referred formally to the central laboratory-residency department in 2016 were included with assessment of their demographic data and risk factors.

Ethical consideration:

After the proposal of the study was approved by scientific committee of Kurdistan Board of Medical Specialties, permissions were obtained from directory of health and administrative authorities of Residency institute.

The aim and content of the study were explained for all positive subjects in 2016 and an informed consent was obtained from each of them. Participation was absolutely voluntary, personal autonomy was respected and all obtained information were coded anonymous and kept confidential. All positive cases were given information regarding their type of infection, mode of transmission, nature of the disease and possible complications. An educational printed handout (prepared by the researcher) prepared in three languages (Kurdish, Arabic and English) were given to the positive cases accordingly.

The questionnaire was filled by either a direct interview of the participants by researcher in the residency institute in a private room to keep the patients privacy or by telephone contact of those who couldn't attend the interview for any reason. All subjects who were sent formally to the central lab-residency department for screening with (HBsAg, HCV Ab and HIV Ab) who had positive results were included.

The questionnaire form include detailed history about their age, gender, residency, history of immunization for HBV, surgery, dental procedures, blood transfusion, Parenteral drug misuse, tattooing, other medical conditions, and family history of HBV, HCV, HIV infection

Five mL of venous blood was obtained from each participant using disposable syringes. Three ml of the serum was taken into two labeled sterile ependorf tubes, the first tube was used for detection of HBsAg, HCV Ab and HIV Ab and the other tube stored and used for confirmation of the HBV, HCV and HIV positive cases. All infected utensils were properly disposed.

There were four types of automated instrument used in detecting HBsAg, HCV Ab and HIV Ab which were Cobas , Semen's, Vida's and liaison.

Whenever a suspicious case detected further study was done for confirmation, using other automated instruments. For HCV Ab and HIV Ab positive cases a further confirmatory test was done with western blot test.

Statistical analysis; using Statistical Package for the Social Science-23 was applied to identify descriptive analysis (the range, mean and standard deviation, Frequency and percentages). Chi square and unpaired T test were used to find association between age and other variables. P-value ≤ 0.05 regarded as a significant level.

3. RESULTS

A total number of 275 979 foreigners who had visited Sulaimani Governorate and screened for HBV, HCV and HIV infection from (2013 through 2016) were retrospectively analyzed , and overall prevalence was (4.7/1000) for HBV, (0.97/1000) for HCV and (0.1/ 1000) for HIV infection, Table 1.

Table 1: The average prevalence of HBV, HCV and HIV in (2013 through 2016).

HBV+ve		HCV+ve		HIV+ve	
Number	Prev.	Number	Prev.	Number	Prev.
1318	4.7/1000	267	0.97/1000	30	0.1/1000

The rate of HBV, HCV and HIV infection for each separate year and Trends in number of visitors and prevalence of different infections in each year , Table -2 and Fig. -1.

Table 2: Number of visitors and rate of infection in each year between (2013-2016).

Year	Total Visitors	HBV+ve		HCV+ve		HIV+ve	
		N	Prevalence (per 1000)	N	Prevalence (Per 1000)	N	Prevalence (per 1000)
2013	98937	480	4.9	79	0.8	12	0.12
2014	116838	364	3.1	89	0.76	12	0.1
2015	40308	321	8	74	1.8	3	0.75
2016	19896	153	7.7	25	1.25	3	1.5

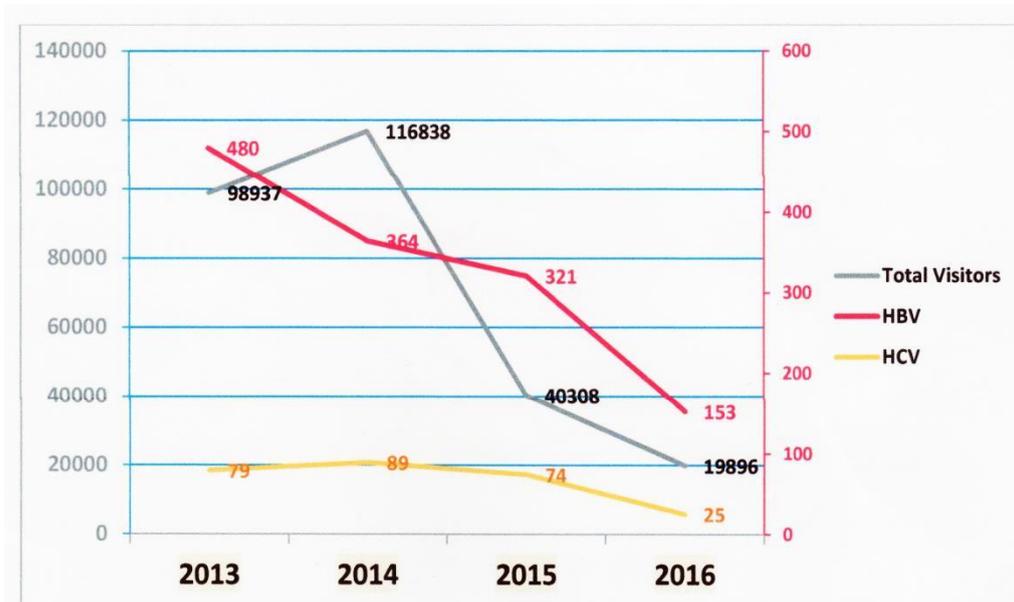


Figure 1: Trends in numbers of visitors and rate of infection from (2013) through (2016).

Of 181 cases that had positive test results in 2016, the distribution of viral type was as follows: HBV 84.5%, HCV 13.8% and HIV contributed to 1.7% of cases, Table 3.

Table 3: Distribution of viral type for a sample of 181 positive tests in 2016.

Virus	Frequency	Percent
HBV	153	84.5
HCV	25	13.8
HIV	3	1.7
Total	181	100

The number of visitors and prevalence of HBV and HCV Positive results among different countries in 2016, Table 4.

Table 4: Prevalence of HBV and HCV among different countries in 2016.

Country	Visitors (total)	HBV(=n)	HBV %.	HCV(=n)	HCV %.
Turkey	6100	29	0.48	1	0.016
Iran	3625	8	0.2	6	0.16
Indian subcontinent	3439	16	0.46	3	0.088
Syria	2770	70	2.5	3	0.1
Far East	1745	16	0.9	2	0.11
Egypt	858	2	0.23	2	0.23
Europe	850	6	0.7	7	0.82
USA	317	2	0.6	non	Non
Others	165	4	2.4	1	0.6

-Far East countries are: China, Korea, Japan, Indonesia, Malaysia and Philippines.

- Indian Subcontinent includes: India, Pakistan, Bangladesh and Nepal.

-Others: Cambodia, Myanmar, Australia, Palestine, Sudan, Afghanistan.

The contribution of Different countries for HBV and HCV cases in 2016 are shown, Table -5.

Table 5: Contribution of different countries for HBV and HCV infection in 2016.

Country	HBV	HCV	No	percent	no	percent
Syria			70	45.8	3	12
Turkey			29	18.9	1	4
Indian subcontinent			16	10.4	3	12
Far East			16	10.4	2	8
Iran			8	5.4	6	24
Europe			6	3.9	7	28
Egypt			2	1.3	2	8
USA			2	1.3	0	0
Others			4	2.6	1	4
Total			153	100	25	100

In 2016, the majority of the visitors were from Turkey, Iran, and India, Table -6.

Table 6: Number and percentage of the visitors according to their countries.

Country	No of visitor	percentage
Turkey	6100	30.6
Iran	3652	18.4
Indian Subcontinent	3439	17.4
Syria	2770	13.9

Far East	1745	8.8
Egypt	858	4.3
Europe	850	4.2
USA	317	1.6
Others	165	0.8
Total	19896	100

Among 19896 visitors in 2016, 16990 were males (85.4 %) who comprised 74.8% of positive cases and 2906 were females (14.6 %) who comprised 25.2% of positive cases, Table 7.

Table 7: Gender distribution among visitors in 2016

Gender	Visitors Number (%)	Positive cases Number (%)
Male	16990 (85.4)	137 (74.8)
Female	2906 (14.6)	46 (25.2)
Total	19896 (100)	183 (100)

Among a total number of (19,896) individuals who were screened in 2016, one hundred fifty three (153) visitors were positive for HBV, with females having higher prevalence (12.7/1 000) compared to males (6.8/ 1 000), Table-8.

Table 8: Gender difference in rates of HBV in 2016.

Gender	HBV +ve	HBV -ve	Total	Prevalence	P-Value
Males	116	16874	16990	6.8/1000	0.0011 (Chi Square test)
Females	37	2869	2906	12.8/1000	
Total	153	19743	19896		

Among total number of (19896) individuals who were screened in 2016, 25 visitors had positive test for HCV, of these 19 cases were males and 6 cases were females. Although females had higher rates of HCV than males (2/1000 Vs 1.1/1000), these values were not statistically significant, Table 9.

Table 9: Gender difference in rates of HCV in 2016.

Gender	HCV+ve	HCV-ve	Total	Prevalence	p-Value
Male	19	16971	16990	1.1/1000	0.294 (Chi Squared test)
Female	6	2900	2906	2/1000	
Total	25	19871	19896		

In the current study the minimum age was 18 years and maximum was 65 years. The mean age of individuals was 35.8±10 years and 95% confidence Interval (CI) of (33.92 – 37.70). There was no significant age difference among HBV and HCV positive individuals, Table-10.

Table -10: Mean age difference among HBV, HCV and mean age of studied sample.

	Number	Mean Age/year	SD	P-Value
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HBV	153	35.88	9.95	0.521 (Unpaired t-Test)
HCV	25	37.26	10.05	

The most common risk factors among the positive cases of HBV and HCV were dental procedures followed by surgery and family history; Tables -11, 12.

Table -11: Risk factors among individuals who had positive tests for HBV infection.

Risk Factors	Frequency	Percentage
Dental procedure	60	39.2
Surgery	18	11.8
Positive family history	16	10.5
Tattooing	12	7.8
Blood Products Transfusion	8	5.2
Multiple Sexual partners	7	4.5
I.V Drug User	2	1.3
Hemodialysis	1	0.7
More than One	17	11.2
No identifiable risk factor	12	7.8
Total	153	100

Table -12: Risk Factors among individuals who had positive tests for HCV.

Risk Factors	Frequency	Percentage
Dental procedure	5	20
Tattooing	3	12
Surgery	2	8
Positive family history	2	8
Multiple Sexual partners	1	4
Blood transfusion	1	4
More than One	6	24
No identifiable risk factor	5	20
Total	25	100

Eighty nine point five percent of cases of HBV and 92% of HCV cases had no family history while 10.5% of patients with HBV and 8% of HCV cases had a positive Family History, males had higher marital rate (65.2%) than females (45.7%).

Regarding awareness of their diagnosis, 70.5% of HBV and 76% of HCV positive cases had no prior diagnosis while 29.5% of HBV and 24% of HCV positive cases knew about their diagnosis

Regarding the previous vaccination against HBV, 47.7% of positive cases had no vaccination, 17% were vaccinated and 35.3 % were unsure whether they are vaccinated or not, among those who were vaccinated against HBV, 53.8% had a complete vaccination history, 19.3% had incomplete vaccination, and 26.9% were uncertain about the doses they received.

Regarding the Occupation of the visitors, majority were laborers, housemaid and Office workers, Table-13.

Table-13: Occupation among the visitors in 2016.

Occupation	Number	Percent
Laborer	82	45.4
Housemaid	35	19.3
Office worker	19	10.5
Teacher	12	6.7
Free job	10	5.5

Engineer		6	3.3
Health worker		3	1.6
Massage center	3		1.6
others		11	6.1
Total	181	100	

4. DISCUSSIONS

Hepatitis B, C and HIV infections comprise a significant public health problem worldwide. They share the same route of transmissions, commonly sexually, blood transfusion, major and minor operations, needles contaminated with the blood of the infected patient, tattooing and vertical from mother to the child. [15], [16], [17], [18]. In our study, a total number of 275,979 foreigners who had visited Sulaimani Governorate and screened for HBV, HCV and HIV infections were analyzed. The prevalence of HBV, HCV and HIV infections were different according to the different countries, and some of our prevalence were different from their own country that may be due to the difference between our sample size and sample type.

In this study, the overall prevalence of HBV infection was 0.47% (in 2013 through 2016) which is lower in comparison to the Aparna et al study (1965-2003), in which 17,029 records screened, 1800 report on the prevalence of HBsAg covering 161 countries all over the world were included, HBsAg seroprevalence was 3.61% [23], this may be resulted from increase in the health education, screening, improvement of vaccination against HBV all over the world and advances in the treatments.

In 2015 and 2016 the prevalence of HBV infection was relatively higher than 2013 and 2014. The increase in the prevalence may be related to the increase in the Syrian visitors and Refugees to our city who they had the highest prevalence of HBV infection in our study.

In 2016, The highest prevalence was among Syrian visitors which was 2.5% and this result is near to the result of Hussein et al study (2016) done in Duhok city on a total number of 880 Syrian refugees, 34 cases (3.86%) had positive HBsAg [24].

In Muselmani et al study done in AL Assad university hospital on the blood donors (2013), they found the prevalence of HBV to be 1.3% [25], which is lower than in our study, probably this is because of the war that happened in that country since 2013 with near complete collapse of the health system. Beside this since beginning of the war in Syria hundreds of mass casualties had happened in the country with a large numbers of injuries, operations and blood transfusions.

The prevalence of HBV in Far East countries (China, Korea, Japan, Indonesia, Malaysia and Philippines) was 0.9% in the current study, while it was nearly 8% in Liang et al study done in China in 2006 [26] and 16.7% in Stephen et al study (2003) done in Philippines, [27] both study were on their citizens, this may be related to the difference in the sample type and the improvement in Hepatitis B vaccination.

Among Turkish visitors, the prevalence of HBV was 0.48% in our study while it was 4.24% in Furuncuoğlu et al study (1995-2015), done in Istanbul on their 26001 citizens from 1995 through 2015 [28].

The prevalence of HBV among the Iranian visitors was 0.2% while it was 2.2% in Mostafa et al study (1990-2016), [29] in which they depended on multiple large studies on the prevalence of HBV infections from 1990 through 2016 done on their citizens.

This may be due to the acknowledgement of screening program in Kurdistan by the Turkish and Iranian visitors, with those who had a previous diagnosis with HBV do not visit and ask

for residency in Kurdistan region, because they do not achieve Residency agreement by the Kurdistan Authorities.

In the current study, the prevalence of HBV among Europeans visitors was 0.7 % which is near to the result of Rantala et al study (2008) which showed the prevalence to be between 0.5-1.5 percent in some Europeans countries [30]. Among American visitors HBV was 0.6% which is near to the result of Wasley et al study in USA (1999-2006) which was 0.27% [31]. This low prevalence may be related to the good and proper health care including screening and vaccination program in European countries and American States.

In our study the overall prevalence of HCV infection was 0.097% from 2013 through 2016, while the overall world's prevalence was 1% in Sarah et al study [32]. This may be related to the size and the type of our sample as mentioned above. The highest prevalence of HCV infection was among the European visitors which was 0.82% that is near to the Sarah et al study that showed the prevalence of HCV infection in European countries to be, 0.5% in Hungary, 0.3 % in Germany, 1.1% in Greece, 0.6% in Ireland, 1.1% in Italy, 0.4% in Sweden and 0.3% in UK. [32]. This may be due to the high rate of homosexuality, multiple sexual partners, increasing injecting drug abusers, increase Alcohol consumption and lack of a specific vaccine.

In this study, the overall prevalence was 0.01 % (30 cases) in 2013 through 2016. In 2016 there were only 3 cases of HIV infection, all of them were females. The Sample size was too small to represent the prevalence of a specific country. In our study we did not have any confection of HBV, HCV and HIV.

The highest number of visitors were in 2013 and 2014 because the Kurdistan Region economically were growing rapidly till 2015 when the economic crises had happened and our Region attacked by Islamic state in Iraq and Sham (ISIS), the number of visitors sharply declined to its lowest level in 2016.

Majority of our visitors in 2016 were from Turkey 30.6% and Iran 18.4%, that is related to being neighborhood to these countries, a strong economical relationship and presence of many companies representative of these countries in our region for which they employ their own citizens. Followed by visitors from Indian subcontinent 17.4%, a group of developing countries where individual annual income is too low forcing them to work outside their countries and our region is one of those places to work in, on the other hand Syrian visitors and refugees comprise about 13.9% of total visitors and that is related to the state of war in the country that endangers their life making them flee for safety and livelihoods.

Among 19896 visitors in 2016, 16990 subjects were males (85.4%) and 2906 subjects were females (14.6 %) of visitors. This may be due to that the majority of the visitors were laborers. Among these, 153 cases had positive test for HBV, of these 116 cases were males and 37 cases were females, with females having higher prevalence of HBV infection (1.28%) compared to males (0.68%), this may be due to low sample size of females compared to males in our study. Twenty five cases had positive test for HCV, of these 19 cases were males and 6 cases were females. Although females had higher rates of HCV infection than males (2/1000 vs. 1.1/1000) but these values were not statistically significant. Among 181 positive cases the distribution of viral type was as follow, 84.5% HBV, 13.8% HCV and 1.7% HIV. This is near to the result of Hussein et al study on Syrian refugees in Duhok city in which the majority of positive cases were HBV [21], this is related to the high infectivity of HBV in comparison to HCV and HIV. Age of the patients ranged between (18-65) years with mean age of individuals being (35.81 ± 9.9) , majority were in 4th decade of life, this is because of most of those who ask for residency are coming for working. This goes with Arab et al [33], Attarchi et al [34], Farhat et al [35] and Vahid et al study [36] which showed the mean age of their participants to be above 30 years.

In the current study, there was no significant age difference among HBV +ve and HCV +ve individuals.

Unsafe medical practices including dental procedures could facilitate the transmission of the HBV infection. In our study about 39.2% of HBV cases and 20% of HCV cases had history of dental procedures .Surgical operations, family history, tattooing and blood transfusion were other major risk factors after dental procedures, which make a sense of importance of safe medical precautions in transmitting the disease. This goes with the study done by Reingold *et al* (2003), who found a high rate of HBV infection among those who had dental procedures. [37]. Also in Janahi et al study done in Bahrain, they screened more than 800,000 of foreigners and their citizens and found that most common risk factors were dental procedures 37.2% followed by surgery , family history and tattooing[38] .The family history is another important risk factor for HBV and HCV acquisition especially when the mother is the carrier , and this is the most common route of infection in the highly endemic regions [39], in Mohammad et al study it was shown that about 30% of HBV cases were having a family history[6]. In our study 10.5% of HBV positive cases and 8% of HCV positive cases had positive Family History; this may be related to unawareness of a previous diagnosis by majority of the visitors.

About the marital status of the patients, 65.2% of males and 45.7% of females were married, and the marriage is considered to be an important risk factor for getting infection with both HBV and HCV infections and this was found in Mohammad et al study [6].

Regarding the previous vaccination against HBV, 47.7% of positive cases had no vaccination history this may be related to the age of the patients and the vaccination program in their countries, 17% were vaccinated and 35.3 % were unsure whether they are vaccinated or not. Among those who were vaccinated against HBV, 53.8% had a complete vaccination history, 19.3% had incomplete vaccination, and 26.9% were uncertain about the doses they received. Immunization reduced the prevalence of HBV infection among the populations worldwide .Ray Kim et al. (2009) showed that An encouraging trend is that the incidence of acute hepatitis B in the United States had declined as much as 80% between 1987 and 2004, explained by effective vaccination programs and universal precautions in needle use and in healthcare in general [40].

Regarding the occupation of the positive cases, 45.4% were laborers, this may be related to low health education and high rate of work related accidents among this group, 19.3% were working as a housemaid, 10.5% were company officer and 6.7% were teachers. We had a group who did not have a specific occupation; these were the Syrian refugees coming to Kurdistan region to settle.

In a search to find out the fate of the positive cases we found that all positive visitors were sent back to their countries except the Syrian visitors who were sent to Kurdistan center for Gastroenterology/Health department in Sulaimani city to be treated accordingly.

5. CONCLUSIONS

The overall prevalence of HBV infection was much higher than HCV and HIV infections, and it was highest among the Syrian visitors. The prevalence of HCV infection was highest among Europeans.

The number of the visitors was largely declined in 2015 and 2016 as compared to 2013 and 2014 because of the economic crises and ISIS attack on our region.

The highest number of visitors was from Turkey, Iran and Syria. Majority of the visitors were males, married and in the 4th decade of life.

HBV positive cases had low rate and incomplete vaccination history. History of dental procedures, surgery, tattooing, and blood transfusion was high among HBV and HCV positive cases.

The authors disclose that they have no conflict of interest.

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