

PREVALENCE OF HEPATITIS B AND HEPATITIS C VIRUS INFECTIONS AT PREMARITAL SCREENING PROGRAM IN DUHOK, IRAQ

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ABSTRACT

Background: Viral hepatitis causes increasing mortality worldwide despite all the efforts to control this health problem. Premarital screening program provides an opportunity to detect and manage hepatitis B and hepatitis C viruses. Determination of a carrier status during premarital testing will create awareness between the couples and lead to the protection of the prospective spouse by early vaccination or treatment. The objective of this study is to determine the prevalence of hepatitis B and hepatitis C virus infections among premarital couples in Duhok, Iraq.

Subject and Methods: This cross-sectional study was conducted from August 2016 to April 2017 in the clinic and laboratory of the premarital screening program within the preventive health affairs in Duhok-Iraq. The sample size was 2000 persons (1000 males and 1000 females). All persons were tested for HBs Ag, total anti-HBc, and anti-HCV.

Results: The age ranged from 14 years to 75 years with a mean of 25.1 years (95% CI = 24.8-25.4 years). The prevalence of HBV infection was 1.1% (N=22), isolated anti-HBc as 3.1% (N=62) and HCV seropositivity was 0.2% (N=4). The factors associated with HBV and HCV were being a health professional ($P < 0.001$), having a history of trauma ($P = 0.003$) and having a family history of HBV or HCV ($P < 0.001$).

Conclusions: The prevalence of HBV infection, isolated anti-HBc, and HCV seropositivity is low among the premarital people. Including total anti-HBc in the current premarital screening program will detect anti-HBc which helps in the efforts to control and manage HBV.

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Keywords: Hepatitis B, hepatitis C, premarital, Duhok.

Viral hepatitis is an important health and socioeconomic problem all over the world, despite all the advances in their prevention and management. Globalization has faded the borders which increased the threat of viral infections and put them on the agenda of governments, especially in Asia and Africa¹. The most common causes of chronic hepatitis are hepatitis-B virus (HBV) and hepatitis C virus (HCV) which are blood-borne diseases with transmission being via direct blood contact, vertical transmission from infected mothers to their children,

intravenous drug use, transfusions of blood or its components, and sexual contact although the sexual route for transmission of HCV has been disputed^{2,3}.

Chronic viral hepatitis caused 1.34 million deaths in 2015 which is comparable to deaths caused by tuberculosis and higher than HIV infection. However, the mortality from viral hepatitis is increasing over time, while that caused by tuberculosis and HIV is declining⁴. Most viral hepatitis deaths in 2015 were due to cirrhosis and hepatocellular carcinoma. Worldwide, in 2015, an estimated 257

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million people were living with chronic HBV infection, and 71 million people with chronic HCV infection⁴.

The serological marker for HBV infection is HBs Ag which is detected 1-10 weeks after the acute exposure to HBV in the serum. Chronic HBV infection occurs when HBs Ag persists more than six months⁵. In patients with resolved infections, low-level chronic infections or infection with atypical variants of HBV, anti-HBc alone may be the only detectable serological marker of HBV infection⁶. The serological marker for HCV is the anti-HCV which appears on average after two months but may take up to six months in some cases⁷.

Premarital screening is a preventive health program that has been adopted in many countries worldwide with the aim to detect and treat unrecognized disorders and prevent the disease transmission to couples and children. It also involves the health promotion of a woman and her partner before pregnancy and is an important step to protect the society and allow people to enjoy life⁸. It includes premarital health counseling and a general medical examination⁹. The process educates couples and provides them with information. Premarital education and counseling appear to be effective in strengthening marriages and has been shown to be beneficial⁸. The implementation of premarital infectious disease screening is an ambitious and massive project with regard to cost and impact¹⁰. The program for the premarital screening was initiated in 2008 at Duhok in Kurdistan region of Iraq¹¹.

The local data about the prevalence of HBV and HCV are scarce. In Iraq, a

national survey has been done in 2005-2006¹². Since then studies have been done in different groups of people at Duhok, Kurdistan region of Iraq with another study done in Sulaimani Governorate in 2012 about the prevalence of HBV in premarital people¹³. The lack of data about the prevalence of HBV and HCV in the premarital people in Duhok has motivated us to proceed with this study aiming to determine the prevalence of HBV and HCV infections among the premarital couples in Duhok, Iraq and to identify the risk factors of these infections.

PATIENTS AND METHODS

The preventive health affairs have established the premarital screening program as a mandatory prerequisite for a healthy marriage to screen for hemoglobinopathies and infectious diseases (HBV, HCV, HIV, and syphilis). The current program tests all people for HBs Ag, anti-HCV, anti-HIV, and anti-TPHA.

This cross-sectional study was conducted from August 2016 to April 2017 in the clinic and laboratory of the premarital screening program within the preventive health affairs in Duhok-Iraq. The whole sample size was 2000 people (1000 males and 1000 females) selected by simple random sampling. The study design was approved by the scientific committee of the college of medicine in Duhok University.

The couples were interviewed, and data were collected by a standard questionnaire that included demographic data about age, nationality, and occupation. Then they were asked separately about the risk factors for HCV and HBV including

history of dental procedures, surgical operations, endoscopy, blood transfusion, hemodialysis, tattooing, body piercing, parenteral drug use, trauma, sharing of razors and toothbrushes, family history of HBV or HCV and unprotected sex with multiple sex partners. In this study, we also tested all the people for total anti-HBc which is not done in the premarital screening program.

A venous blood sample of 5 ml was collected in gel tubes and left to clot at room temperature then the serum was extracted by centrifuge at 3000 RPM for 5 min. Sera were stored at -20°C until testing for viral markers were done. HBs antigen (Biorex diagnostics®), total anti-HBc (DiaSorin ®), and anti-HCV (4th generation from Biorex diagnostics®) were tested by ELISA technique with strict adherence to the manufacturer's protocols in testing and interpreting the results. Patients with positive total anti-HBc and negative HBs Ag were also tested for anti-HBs (DiaSorin ®).

Patients were defined as HBV infection when they tested positive for HBs Ag, isolated anti-HBc when they tested positive for total anti-HBc and negative for HBs Ag and anti-HBs antibodies and seropositive for HCV when they tested positive for anti-HCV^{1, 14}.

STATISTICAL ANALYSIS

Analysis of data was done using Statistical Package for the Social Sciences (SPSS) program version 21.0 for windows. Statistical analysis was conducted to calculate the P -value using χ^2 (or Fisher's exact test if an expected number in any cell was less than 5). Testing for differences among the means of groups was done

using ANalysis Of VAriance (ANOVA). For the associations or differences to be significant, the P -value should have been less than 0.05¹⁵.

RESULTS

The age ranged from 14 years to 75 years with a mean of 25.1 years (95% confidence interval (CI) = 24.8-25.4 years). The prevalence of HBV infection was 1.1% (N=22), isolated anti-HBc were 3.1% (N=62), and HCV seropositivity was 0.2% (N=4). All cases with positive HBs Ag also had positive total anti-HBc. The prevalence of HBV infection in males was higher than in females (1.4% versus 0.8%). No cases of concomitant HBV and HCV seropositivity were found.

Table 1, shows the risk factors of HBV and HCV infections. There was no significant statistical difference in the mean age of people with HBV infection or HCV seropositivity. Neither sex nor nationality was statistically associated with any of the HBV infection or HCV seropositivity. Among the occupations, only being a health professional was highly associated statistically with HBV and HCV ($P < 0.001$). A history of trauma ($P = 0.003$) and a family history of HBV or HCV ($P < 0.001$) were significantly associated with HBV infection and HCV seropositivity.

There was no significant statistical association among HBV infection or HCV seropositivity with history of dental procedures, surgical procedures, tattooing, body piercing, endoscopy or blood transfusions ($P > 0.05$). There was no history of hemodialysis in the study population and none of the people involved

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in the study admitted using of parenteral drugs, sharing of razors or toothbrushes or having unprotected sex with multiple sex partners.

Table 1: Association of factors with HBV and HCV infections (N = 2000)

Indicator	HBs Ag +ve (N=22)	Anti-HCV +ve (N=4)	HBs Ag -ve, anti-HCV -ve (N=1974)	P-value
Age in years± SD	23.6 ± 3.6	27.3 ±5.7	25.1 ±6.7	0.46
Male	14 (0.7)*	2 (0.1)	984 (49.2)	0.43
Female	8 (0.4)	2 (0.1)	990 (49.5)	
Nationality				
Iraqi	20 (1)	3 (0.15)	1878 (93.9)	0.11
Non-Iraqi	2 (0.1)	1 (0.05)	96 (4.8)	
Occupation				
Students	4 (0.2)	1 (0.05)	433 (21.65)	0.9
Service and sales workers	3 (0.15)	1 (0.05)	286 (14.3)	0.83
Army forces	3 (0.15)	0	138 (6.9)	0.4
Governmental employees	3 (0.15)	1 (0.05)	123 (6.15)	0.11
Home maker	3 (0.15)	0	74 (3.7)	0.052
Health professional	2 (0.1)	1 (0.05)	40 (2)	<0.001
Others	0	0	183 (9.15)	
None	4 (0.2)	0	697 (34.85)	0.083
History of dental procedure	12 (0.6)	1 (0.05)	868 (43.4)	0.45
History of surgical operation	6 (0.3)	0	578 (28.9)	0.43
History of trauma	1 (0.05)	1 (0.05)	38 (1.9)	0.003
History of tattooing	2 (0.1)	0	140 (7)	0.8
History of body piercing	14 (0.7)	1 (0.05)	932 (46.6)	0.20
History of endoscopy	1 (0.05)	0	82 (4.1)	0.91
History of blood transfusion	1 (0.05)	0	42 (2.1)	0.70
Family history of HBV or HCV	2 (0.1)	1 (0.05)	32 (1.6)	<0.001

DISCUSSION

Viral hepatitis remains a major health problem with significant mortality and morbidity rates⁴. Premarital screening program is an important opportunity to control and prevent genetic disorders, and some infectious diseases like HBV and HCV, limit the spread of infectious

diseases, avoid their social and psychological impacts for families and raise the awareness about the concept of healthy marriage¹⁶.

In this study the prevalence of HBV infection was 1.1%. This rate is lower than that established by the only available national study done in 2005-2006 in

which, the national prevalence of HBV infection was 1.6% and the local prevalence of HBV in Duhok was 3%¹². It is also lower than that determined by other studies done in Duhok in different population groups including newly recruited police (7.2%)¹⁷, hemodialysis patients (3.2%)¹⁸, patients undergoing elective surgery (1.79%)¹⁹, tuberculosis patients (1.87%)²⁰, and patients underwent dental interventions (1.99%)²¹ but it was higher than that found by the study done in 2012 at Sulaimani in the premarital population which was 0.67%¹³ and in another study done in Duhok among blood donors (0.78%)²². These variable rates may be due to the variable groups of people included in these studies with different risk factors profile and the time at which the study was done but in general the rate that has been determined in this study is within the low prevalence areas (<2%)¹³ and is less than that established by the only available national survey¹² conducted before about a decade and this reflects declining prevalence of HBV which could be attributed to the expanded vaccination program, improved health awareness and services, and better case detection and management. In Duhok, screening for viral hepatitis (HBV and HCV) is currently part of the premarital screening program, preoperative checks, hemodialysis patients, blood donors and non-Iraqi requesting for residency in Iraq. Other factors contributing to the low prevalence of HBV infection is that Duhok can be considered a low-risk population in terms of drug abuse and sexual promiscuity from the strict legislation and enforcement. The prevalence of isolated anti-HBc was 3.1%. This is much lower than that found

in the national survey which was 9.7%¹². This is also another indicator for the declining prevalence of HBV infection. Isolated anti-HBc is important to be recognized and managed appropriately as it has clinical significance in four main areas: it can be transmitted (through blood transfusion and organ - mainly liver - transplantation) causing typical HBV in newly infected individuals; the development of an immunosuppressive status may induce HBV reactivation and development of acute and sometimes fulminant hepatitis; a large body of data suggests that it can contribute to the progression of the chronic liver disease toward cirrhosis; and evidence suggests that it can be involved in hepatocellular carcinoma (HCC) development²³. The inclusion of total anti-HBc to the current premarital screening program will help to detect isolated anti-HBc which is about three times more common than the HBV infection cases and will intensify our efforts to control HBV through case detection and management.

The prevalence of HCV seropositivity in this study was 0.2%, which is nearly consistent with findings from previous studies performed in Duhok^{13, 22}. This is similar to the rate established for Iraq by a modeling study done in 2015 by the Polaris observatory HCV collaborators about the global prevalence and genotype distribution of hepatitis C virus infection²⁴. It is also similar to that reported by the national survey in Duhok (<0.3%)¹². This relatively stable and low prevalence of HCV seropositivity may reflect the better health services in terms of blood screening and screening of non-Iraqi requesting for residency in Duhok although the study

done by Polaris observatory HCV collaborators considered Iraq as one of the countries that showed a 10% or greater growth in prevalence of HCV since 2007 due to foreign workforce from endemic countries²⁴.

In this study, the prevalence of HBV was more among males than females (1.4% versus 0.8%) although there was no significant statistical difference between them. HCV seropositivity was equal in females and males. It has been observed in many studies that HBV infection affects males more than females^{12, 13, 16, 25}. There is no clear explanation for this gender variation. The difference is probably related to the conservative society with less female exposure outside the family, but may also be due to opposite effects of sex hormones. In several experimental animal models, viral transcription is stimulated by androgen, while estrogen suppresses HBV transcription²⁵.

The association of risk factors with HBV and HCV has been a variable in different studies. Studying risk factors for HBV and HCV is a very important part of the efforts for control and prevention of these infections. It can provide the health authorities with insight to the weak points in their health care delivery system that increase the risk of spread of HBV and HCV²². In this study, the factors associated with HBV and HCV were being a health professional, having a history of trauma and having a family history of HBV or HCV. In a study done among blood donors in Duhok, the risk factors were having dental or surgical procedures²². In the study done in Sulaimani among premarital people, the risk factors were occupation, history of surgical operation,

blood transfusion and tattooing. In a study done in Saudia Arabia, the risk factors were history of dental procedures, blood transfusion, hemodialysis and family history of HBV or HCV²⁶. This difference in the risk factor profile could be attributed to the changes in the health care system with the screening of blood and its products and the preoperative check of all patients in addition to the ministry of health efforts to ensure adequate sterilization of materials before medical procedures including dental procedures, surgical procedures and endoscopy.

In this study, being a health professional was a risk factor for HBV and HCV and this has been established in other studies²⁷. Healthcare workers are exposed by a mucocutaneous or percutaneous route to accidental contact with human blood and other potentially infectious biological materials during their occupation²⁷. This should urge the health authorities to increase their efforts in increasing the awareness about HBV and HCV and expand the vaccination program to include all health care workers and students in the practical medical colleges. Having a history of trauma was also a risk factor for HBV and HCV which was also reported in another study²⁷. Trauma increases the risk of medical interventions and exposure to blood and blood products which could increase the risk of HBV and HCV²⁸. Improving the trauma services would reduce this risk. Family history of HBV or HCV was also a risk factor for these infections which has been reported in the study done in Saudia Arabia²⁶. The vertical transmission may be an explanation for this risk factor although the close contact between family members

especially children and adolescents and shared towels, shaving items or toothbrushes are common among families of a lower socioeconomic level¹.

The main limitation in this study is that molecular studies have not been done on isolated anti-HBc positive patients. Hence there may be missing of some HBsAg positive cases, which might underestimate the real frequency of HBV infection.

In conclusion, the prevalence of HBV infection, isolated anti-HBc and HCV seropositivity is low among the premarital people. The factors associated with HBV and HCV were being a health professional, having a history of trauma and having a family history of HBV or HCV. Including total anti-HBc in the current premarital screening program will detect isolated anti-HBc which helps in the efforts to control and manage HBV.

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پوخته

ریژا به لاقبونا کولبونا جهرگی یا فایروسی جورئ (بی) و جورئ (سی) ل پروگرامی پشکینا بهری هه فزینی ل دهوکی - عیراق

پیشهکی: کولبونا جهرگی یا فایروسی بوویه ئه گهری زیده بوونا ریژا مرنی ل هه می جیهانی سهره رای هه می هه ولا بو کونترولکرنا ئه فی ئاریشا ساخله می. پروگرامی پشکینا بهری هه فزینی دهرفته کی ددهت بو قه دیتن و چاره سه رکنا کولبونا جهرگی یا فایروسی (بی) و (سی). دیارکرنا که سین هه لگر ل ده می پشکینا بهری هه فزینی هه شیاریی پهیدا دکهت ل دهف هه ردوو لایه نا و دبیته ئه گهره ک ژبو پاراستنا هه فزینی جافه ریکری ب ریکا فاکسیندانی و چاره سه رکنا بهز

ئارمانج: بو دیارکرنا ریژا به لاقبونا کولبونا جهرگی یا فایروسی (بی) و (سی) د نافبه را هه ردوو لایه نا بهری هه فزینی یل دهوکی - عیراق.

ریکین فاکولینی ئه ف فاکولینه هاتیه ئه نجام دان ل هه یفا ته باخا 2016 تا کو هه یفا ئادارا 2017 ل کلینیک و تاقیگه ها راویژکاریا پشکینا بهری هه فزینی کو دکه فیه ریقه بهریا کاروبارین خو پاراستنی ل دهوکی - عیراق. قه بارئ نمونا 2000 کهس بو (1000 نیرو 1000 می). هه می که سا پشکینن بو هاتنه کرن ژبو HBs Ag, anti-HCV, total anti-HBc.

ئه نجام: ژبی به شداربوویا دنافه را 14 بو 75 سال دا بوو و تیکرایئ ژبی 25,1 سال (24,8-25,4 = CI %95). ریژا به لاقبونا کولبونا جهرگی یا فایروسی (بی) 1,1 % بوو (22 کهس)، دژه له شین دژی HBC بتنی 3,1 % بوو (62 کهس) و پوزه تیغیا فایروسی کولبونا جهرگی جورئ (سی) 0,2 % بوو (4 کهس). فاکته رین په یوه ندی هه ی دگه ل کولبونا جهرگی یا فایروسی (بی) و (سی) ئه فیه بوون: کارمه ندی ساخله می بیت ($P < 0.001$)، یان توشی رویدان و برینداربوونی ببیت ($P = 0.003$) یان ژبی دنافه خیزانی دا ئه فیه نه ساخییه هه بیت ($P < 0.001$).

دهرئه نجام: ریژا به لاقبونا کولبونا جهرگی یا فایروسی (بی) و دژه له شین دژی HBC بتنی و پوزه تیغیا فایروسی کولبونا جهرگی جورئ (سی) ل دهف هه ردوو لایه نا بهری هه فزینی یل کیم بوو. ئه نجامدا پشکینا دژه له شین دژی HBC دپروگرامی نوکه یی بهری بهری هه فزینی یل دا حاله تین جودا یین دژه له شین دژی HBC بتنی دیارکهت کو دبیته هاریکار بو کونترولکرنا و چاره سه رکنا کولبونا جهرگی یا فایروسی (بی).

الخلاصة

خلل التنسج المتعدد في الكورد العراقيين المصابين بسرطان الدم النخاعي الحاد: دراسة أسترجاعية على 105 مريض

الخلفية والأهداف: يسبب التهاب الكبد الفايروسي زيادة نسبة الوفيات في جميع أنحاء العالم على الرغم من كل الجهود المبذولة للسيطرة على هذه المشكلة الصحية. ويوفر برنامج فحص المقيبلين على الزواج فرصة للكشف عن التهاب الكبد الفايروسي "بي" و التهاب الكبد الفايروسي "سي" ومعالجته. تحديد حالة الحامل للفايروس أثناء اختبار ما قبل الزواج سوف يخلق الوعي لدى الطرفين وتسهيل حماية الطرف الآخر من خلال التطعيم المبكر أو العلاج. الهدف من الدراسة الحالية هو تحديد معدل انتشار عدوى فيروس التهاب الكبد "بي" وفيروس التهاب الكبد "سي" بين الطرفين قبل الزواج في دهوك، العراق.

طرق البحث: أجريت هذه الدراسة المقطعية من شهر آب 2016 إلى آذار 2017 في عيادة ومختبر برنامج فحص المقيبلين على الزواج ضمن مديرية شؤون الوقاية الصحية في دهوك -العراق. وكان حجم العينة 2000 شخص (1000 من الذكور و 1000 من الإناث). تم اختبار جميع الأشخاص للفحوصات التالية (HBs Ag, total anti-HBc, and anti-HCV).

النتائج: تراوحت أعمارهم من 14 سنة إلى 75 سنة بمتوسط 25.1 سنة (95%CI = 24.8-25.4 سنة). كان انتشار عدوى التهاب الكبد الفايروسي "بي" 1.1% (ع=22)، والأجسام المضادة (anti-HBc) 3.1% (ع=62) وكانت عدوى التهاب الكبد الفايروسي "سي" المصلية 0.2% (ع=4). كانت العوامل المرتبطة بالتهاب الكبد الفايروسي "بي" و "سي" هيكون الشخص كادر طبي ($P < 0.001$)، كذلك التعرض للحوادث ($P = 0.003$) أو وجود تاريخ عائلي لالتهاب الكبد الفايروسي "بي" أو "سي" ($P < 0.001$).

الاستنتاجات: أن انتشار عدوى التهاب الكبد الفايروسي "بي"، والأجسام المضادة الخاصة anti-HBc وحالات المصلية الموجبة لفيروس التهاب الكبد "سي" منخفض بين الناس المقيبلين على الزواج. أن إضافة فحص الأجسام المضادة anti-HBc الكلي الى برنامج فحص المقيبلين على الزواج الحالي سوف يمكن من الكشف عن حالات الأجسام المضادة الخاصة anti-HBc و التي في السيطرة على التهاب الكبد الفايروسي "بي" ومعالجته.