**Seroprevalence of hepatitis B and hepatitis C virus infections**

**in Diyala** **province during 2003-2008**

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**Abstract:**

**Background:** The seroprevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are largely depend on the rate of chronic carrier in the community and the predominant route of infection.

**Objectives:** to investigate the seroprevalence of hepatitis B and hepatitis C virus infection in Diyala province during the period from 2003 to 2008.

**Materials and methods:** This study was conducted for the period from 1/February/2003 to 30/April/2008. Data were extracted from records of the virology unit in the Public Health Laboratory in Baquba. Data were translated to computerized data base and statistically analyzed.

**Results:** The highest annual prevalence rate of HBV infection was found in 2004 (5.5/1000 tested samples) and highest annual prevalence rate of HCV infection was found in 2004 (2.5/1000 tested samples). The HBV and HCV positive cases were peaked in April months. The HBV positive cases were significantly higher among the age group (20-29) years (p <0.001). The HCV positive cases were significantly higher among the age group (30-39) years (p < 0.001). There is no association between HBV and HCV positivity rates and the district of residence. The HBV and HCV positivity rates were significantly higher (p= 0.009) in males compared to females.

**Conclusion:** Although the annual seroprevalence of HBV is slightly decline, the annual seroprevalence of HCV is increased. Strengthening of surveillance system is recommended.

**Key words: HBV, HCV, seroprevalence**

**Introduction:**

The estimated global prevalence of viral hepatitis is around 3%-5%, which means that approximately 400 million people are infected with HBV and around 170 million with HCV **[1]**. HBV and HCV infections are of major public health concern; infected individuals carry a substantial risk for chronic liver disease, 5%-10% for HBV and more than 50% for HCV**[2,3]**. Furthermore, Several studies have been linked the chronic hepatitis C infection with extrahepatic manifestations **[4,5]**. HBV and HCV share the common feature is that all practices, involves blood-to-blood exposure and other body fluids can potentially be a sources of infection **[6,7]** . Moreover, individuals infected with HBV and to a lesser degree HCV, may transmit the virus to their sexual partners, and in case of mothers to their babies **[8.9]**.

The prevalence of HBV and HCV infections have a wide geographical variation depending on the rate of chronic carrier and the predominant route of transmission **[10,11]**. In Iraq, the intrafamilial childhood horizontal transmission is an important means by which HBV endemicity rate is maintained **[12]**. In a previous study conducted from 1989 to 2002, the prevalence of HBV among volunteers blood donors was 1.6%, and higher prevalence was recorded among risky population **[13,14]**. However, the prevalence of HCV infection was much lower than HBV infection, being 0.15% among blood donors and highest in multiple blood recipients **[15,16]**. The present retrospective study was conducted to determined the annual prevalence of HBV and HCV infections for the period from 2003 to 2008 and to explore whether a change in the prevalence of these viral infections.

**Materials and methods:**

This study was conducted for the period from 1/February/2003 to 30/April/2008. Data were extracted from records of the virology unit in the Public Health Laboratory in Baquba. Detection of HBsAg was carried out by enzme-linked immunosorbant assay (ELISA) and confirmed by HBsAg confirmatory test. The anti-HCV antibody was detected by ELISA and confirmed by immunoblot assay. Demographic informations of HBV and HCV positive patients including age, sex, and residence were also collected. Data were translated to computerized data base and statistically analyzed.

**Results:**

Results presented in table (1) revealed the annual seroprevalence rate (per 1000 tested samples) of HBV infection throughout the study period. The highest seroprevalence rate was found in 2004 (5.5/1000 tested samples) with a 95% confidence interval range (4.7-6.3).

**Table (1) Annual prevalence of HBV infection during study period.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | No. tested | No. positive | Annual prevalence  (per 1000) | 95% CI for prevalence (per 1000) |
| 2003 | 22324 | 97 | 4.3 | (3.5-5.2) |
| 2004 | 32685 | 181 | 5.5 | (4.7-6.3) |
| 2005 | 12727 | 27 | 2.1 | (1.3-2.9) |
| 2006 | 25544 | 98 | 3.8 | (3.1-4.6) |
| 2007 | 10075 | 26 | 2.6 | (1.6-3.6) |
| 2008 | 17105 | 46 | 2.7 | (1.9-3.5) |
| Total | 120460 | 475 | 3.9 | (3.6-4.3) |

Results presented in table (2) revealed the annual seroprevalence rate (per 1000 tested samples) of HCV infection throughout the study period. The highest seroprevalence rate was found in 2004 (2.5/1000 tested samples) with a 95% confidence interval range (2-3.1).

**Table (2): Annual prevalence of HCV infection during study period.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | No. tested | No. positive | Annual prevalence  (per 1000) | 95% CI for prevalence (per 1000) |
| 2003 | 22324 | 33 | 1.5 | (1-2) |
| 2004 | 32685 | 83 | 2.5 | (2-3.1) |
| 2005 | 12727 | 8 | 0.6 | (0.2-1.1) |
| 2006 | 25544 | 45 | 1.8 | (1.2-2.3) |
| 2007 | 10075 | 4 | 0.4 | (0-0.8) |
| 2008 | 17105 | 23 | 1.3 | (0.8-1.9) |
| Total | 120460 | 196 | 1.6 | (1.4-1.9) |

The distribution of HBV and HCV positive cases by year throughout the study period was shown in table (3) and figure (1).

**Table (3): HBV and HCV positive cases by year.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Type of infection | Year | | | | | | |
| 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | median |
| HBV | 97 | 181 | 27 | 98 | 26 | 46 | 46 |
| HCV | 33 | 83 | 8 | 45 | 4 | 23 | 23 |
| Total | 130 | 264 | 35 | 143 | 30 | 69 | 69 |

**Figure (1): Yearly reporting cases during the study period.**

Table (4) and figure (2) represent the monthly distribution of HBV and HCV positive cases throughout the study period (6 years). It was found that both HBV and HCV positive cases were peaked during April month.

**Table (4): HBV and HCV positive cases by month.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Type of infection | Months | | | | | | | | | | | | Median |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| HBV | 30 | 17 | 57 | 72 | 57 | 35 | 44 | 26 | 27 | 45 | 29 | 36 | 35 |
| HCV | 15 | 15 | 12 | 34 | 18 | 6 | 16 | 15 | 10 | 19 | 12 | 24 | 15 |
| Total | 45 | 32 | 69 | 106 | 75 | 41 | 60 | 41 | 37 | 64 | 41 | 60 | 52 |

**Figure (2): Monthly reporting cases during the study period**

The distribution of HBV and HCV positive cases according to the age was presented in table (5). The HBV positive cases were significantly higher among the age group (20-29) years (p Chi-sequare <0.001). Whereas the HCV positive cases were significantly higher among the age group (30-39) years (p Chi-sequare < 0.001).

**Table (5): distribution of HBV and HCV positive cases by age.**

|  |  |  |
| --- | --- | --- |
| Age groups (Ys) | Type of viral hepatitis | |
| HBV (No.%) | HCV (No. %) |
| < 10  10-19  20-29  30-39  40-49  50 + | 12(2.5)  70(14.7)  150(31.6)  139(29.3)  54(11.4)  50(10.5) | 11(5.6)  52(26.5)  54(27.6)  55(28.1)  16(8.2)  8(4.1) |
| Total | 475 (100) | 196 (100) |

The residences of patients were distributed over the five districts in Diyala province. Although, nearly a half (48%) of HBV positive and (40.8%) of HCV positive patients were from Baquba district. However, statistical analysis showed that there is no association between HBV and HCV seropositivity rates and the district of residence, table (6).

**Table (6): distribution of HBV and HCV positive cases by residence.**

|  |  |  |
| --- | --- | --- |
| District of residence | Type of viral hepatitis | |
| HBV (No.%) | HCV (No.%) |
| Baquba  Khalis  Baladruz  Muqdadia  Jalawla | 228(48)  88(18.5)  65(13.7)  77(16.2)  17(3.6) | 80(40.8)  41(20.9)  31(15.8)  35(17.9)  9(4.6) |
| Total | 475 (100) | 196 (100) |

Regarding the gender, the results showed that the HBV seropositivity rate was significantly higher (p= 0.009) in males compared to females (66.7% *vs* 33.3%). Likewise, the HCV seropositivity rate was significantly higher in males compared to females (56.1% *vs* 43.9%), table (7).

**Table (7): distribution of HBV and HCV positive cases by gender.**

|  |  |  |
| --- | --- | --- |
| District of residence | Type of viral hepatitis | |
| HBV (No.%) | HCV (No.%) |
| Female  Male | 158 (33.3)  317(66.7) | 86(43.9)  110(56.1) |
| Total | 475 (100) | 196 (100) |

**Discussion:**

Hepatitis B and hepatitis C virus infections are of major public health concern due to their serious complications on one hand, and their transmission by routes that permits intrafamilial spread on the other hand **[2,4,9,11,12]**. Comparing with our previous studies on the seroprevalence of HBV and HCV in Diyala province before year 2003 **[13,15]**, the present study found that the seroprevalence of HBV infection is dropped down (1.6% and 0.55%) respectively. These encouraging results may be due to the implementation of HB vaccine in the national program of immunization for newborns and risky groups since 1989. Although there is no national evaluation of vaccines; nevertheless, the vaccine was proved its high immunogenicity and efficacious elsewhere **[17-19]**. Another explanation for the decline in the seroprevalence of HBV infection is the cumulative health knowledge of the general population as a result of intensive education programs carried out during the 1990s. On the other hand, the tragedic deterioration of security situation during 2003 and upward intermittently retarded the infectious disease control programs. Hepatitis B surveillance and counseling system and even vaccination are of these affected programs that undoubtedly resulting in under recoding of HBV positive cases **[20]**.

Unlike HBV infection, HCV infection characterized by low plasma viral load, long incubation period that may extend to 3 months, the majority of infections are asymptomatic, and the high chronicity rate **[21,22]**. These factors delay the seroconversion and consequently the serological diagnosis of HCV infection and perpetuate the infectiousness of patients for longer period **[23,24]**. Together these facts may explain the increased prevalence of HCV infection in the present study compared to previous one **[15]**. Therefore, to minimize the risk of transmission of HCV infection through blood transfusion, several countries have introduced the nucleic acid technique (NAT) as a routine screening of blood donors **[25]**. The high sensitivity and specificity of NAT has minimized the risk of infection per blood unit to 1:1600000, and reduced the window period of HCV which was approximately 70 days by ELISA to 8-10 days **[26]**.

The present results found that HBV and HCV infection were significantly higher among the age groups (20-29) and (30-39) respectively. These results were consistent with our studies conducted before 2003 **[13,15]**, and with those conducted elsewhere, probably because these age groups have higher chance for exposure to HBV and HCV infections**[27,28]**.On the other hand, the significantly higher HBV and HCV positivity rates among males compared to females was concordant in present study and previous ones and with the results of other workers **[13,15,29,30]**. Of note, the bulk of individuals included in the present study are blood donors, and as traditions in our community, most of the blood donors attending the blood banks are males **[31,32]**.

The present study found that the HBV and HCV positivity rates were peaked during April month. This result is inconsistent with the most previous reports affirming no seasonality in the transmission of these viruses **[7,20]**. However, further studies to clarify this puzzling result are recommended.

Regarding the distribution of HBV and HCV positive cases according to the residence, although there was insignificant difference in the present study, Baquba district was found to harbor the highest number of cases, and this is inconsistent with our previous studies, in which Al-Mukdadia district has the highest number **[13,15]**. The reasonable explanation is that Al-Mukdadiaand other districts are at leat 30 kilometers away from the center of the Diyala province, so the patients meets difficulties to reach the center of the province under bad security situations which was prevalent particularly during 2005 to 2007.

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**الانتشار المصلي لفيروس التهاب الكبد نمط (ب) و نمط (ج) في محافظة ديالى خلال الفترة 2003-2008**

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**الخلاصة:**

**تمهيد:** ان الانتشار المصلي لفيروس التهاب الكبد نمط (ب) و نمط (ج) يعتمد بشكل كبير على معدل الحالات المزمنة في المجتمع وكذلك على طرق العدوى السائدة في ذلك المجتمع0

**اهداف الدراسة:** لاستبيان الانتشار المصلي لفيروس التهاب الكبد نمط (ب) ونمط (ج) في محافظة ديالى خلال الفترة 2003-2008 0

**المواد وطرق العمل:** اجريت هذه الدراسة للفترة من الاول من شباط/2008 الى الثلاثون من نيسان/2008 0 تم جمع المعلومات من سجلات وحدة الفيروسات في مختبر الصحة العامة في بعقوبة0 حولت تلك المعلومات الى قاعدة بيانات حاسوبية وحللت احصائيا0

**النتائج:** ان اعلى انتشار سنوي لفيروس التهاب الكبد نمط (ب ) كان سنة 2004 ( 5.5/1000 ) واعلى انتشار لفيروس التهاب الكبد نمط (ج) كان في سنة 2004 (2.5/1000 ) 0 ان معدل انتشار فيروس الكبد نمط (ب) و نمط (ج) بلغ ذروته خلال شهر نيسان0 ان الايجابية المصلية لفيروس لالتهاب الكبد نمط (ب) كانت عالية بشكل معنوي بين الفئة العمرية (29-20 ) سنة ( p< 0.001)0 في حين كانت الايجابية المصلية لفيروس التهاب الكبد نمط (ج) عالية بشكل معنوي بين الفئة العمرية (39-30 ) سنة (p< 0.001 )0 لم يكن هنالك ترابط معنوي بين الايجابية المصلية لفيروس التهاب الكبد نمط (ب) ونمط (ج) و موقع السكن0 ان الايجابية المصلية لفيروس التهاب الكبد نمط (ب) و نمط (ج) كانت عالية بشكل معنوي بين الذكور مقارنة بالاناث ( p= 0.009)0

**الاستنتاج:** بالرغم من ان الانتشار المصلي السنوي لفيروس التهاب الكبد نمط (ب) قد شهد انخفاظا محدود، فان الانتشار المصلي السنوي لفيروس التهاب الكبد نمط (ج) قد ارتفع بالمقابل0 وتوصي الدراسة بتفعيل وتنشيط برامج التحري الوبائي0