

# Prevalence of hepatitis B and C among blood donors attending the National Blood Transfusion Center in Baghdad, Iraq from 2006-2009

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## ABSTRACT

**الأهداف:** معرفة مدى انتشار التهاب الكبد من النوع (ب) و(ج) لدى المتبرعين بالدم في المركز الوطني لنقل الدم في بغداد، إضافة إلى تحديد العوامل الديموغرافية مثل الجنس والعمر والإقامة المؤثرة على الحالات التي تحمل أي من هذين الفيروسين.

**الطريقة:** أُجريت هذه الدراسة الاسترجاعية المقطعية في مركز التحكم بالأمراض الانتقالية، بغداد، العراق في يناير 2009م، حيث قمنا بجمع التقارير الشهرية للمرضى من المركز الوطني لنقل الدم والتي سُجلت خلال الفترة من 2006م إلى 2009م. وبالفعل تم فحص الدماء المتبرع بها للمستضد السطحي للفيروس (ب) والأجسام المضادة لالتهاب الكبد (ج) باستخدام فحص إليسا. وقد استخدم برنامج إكسل 2007 لإدخال البيانات وتحليلها.

**النتائج:** أظهرت النتائج أن من أصل 495,648 من المتبرعين فقد كانت تحاليل 3258 (0.6%) منهم فقط إيجابية لالتهاب الكبد (ب)، و933 (0.3%) كانت إيجابية لالتهاب الكبد (ج). وظهر أن متوسط انتشار التهاب الكبد (ب) بين المتبرعين الذكور قد كان عالياً (0.7%) مقارنة بالإناث (0.5%) مع عدم وجود دلالة إحصائية  $p=0.07$ . ومن ناحية أخرى فقد كان متوسط انتشار الأجسام المضادة لفيروس (ج) في نفس المتبرعين عالياً لدى الإناث (0.4%) مقارنة بالذكور (0.2%) مع وجود دلالة إحصائية ( $p=0.000$ ). أما التوزيع الجغرافي للمستضد السطحي للفيروس (ب) والأجسام المضادة للفيروس (ج) لدى الجنسين فقد أظهر انتشاراً عالياً للفيروسين في المناطق الحضرية مقارنة بالمناطق القروية. وبخصوص التوزيع العمري لإيجابية المستضد السطحي للفيروس (ب) والأجسام المضادة لفيروس (ج) فإن معظم المتبرعين بالدم والحاملين لتلك الفيروسات تتراوح أعمارهم ما بين 20-40 عاماً.

**خاتمة:** تبين هذه النتائج أن بغداد هي ذات توطن منخفض لفيروسات التهاب الكبد (ب) والأجسام المضادة للفيروس (ج). وأن الرجال يحملون الفيروس (ب) أكثر من النساء في حين أن النساء يحملن فيروس (ج) أكثر من الرجال، ولأن هذه البيانات الباثية ذات قيمة لتقييم المخاطر، فإن هناك حاجة إلى مزيد من الدراسات لتقديم مزيد من التفاصيل حول حالة عدوى التهاب الكبد (ب) والتهاب الكبد (ج) في المحافظات الأخرى لتحديد النهج الوقائي الفعال وفائدة تطوير الأنشطة التي تحد من انتشار المرض.

**Objectives:** To estimate the prevalence of hepatitis B and C among blood donors attending the National Blood Transfusion Center (NBTC) in Baghdad, Iraq from 2006-2009 and to compare the results with previous year's results and results from studies on a normal population,

and to identify certain demographic characteristics such as age, gender, and residence of positive cases.

**Methods:** This is a retrospective cross-sectional observational study. Monthly reports from the NBTC during the year 2006-2009 were collected. This study took place at Communicable Disease Control Center (CDC), Baghdad, Iraq in January 2010. Analysis of the reports regarding age, gender, and residence was carried out using Excel 2007.

**Results:** The sample size was 495,648 blood donors. Out of them, only 3258 (0.6%) were positive for hepatitis B and 933 (0.3%) were positive for hepatitis C. The average prevalence of HBsAg was higher in men (0.7%) than women (0.5%) with no statistical significance ( $p=0.07$ ) while the prevalence of anti-HCV was higher in women (0.4%) than in men (0.2%) with statistical significance ( $p=0.000$ ). Residence distribution of the positive cases for HbsAg and Anti HCV Ab in both genders was found to be higher in urban areas than in rural areas. Regarding age distributions, most of the affected donors were between 20-40 years age.

**Conclusions:** The findings indicate that Baghdad is of low endemicity with hepatitis B and hepatitis C infection. Generally, men are affected more than women and urban areas more than rural areas. Further studies are needed to provide more details about the status of HBV and HCV infection in other provinces of Iraq. Results of these studies could be utilized to determine the most feasible and useful approaches for strengthening prevention and control activities.

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Several infectious agents can be transmitted through an infected blood and blood products. The most common diseases that are transmitted through blood are hepatitis B and hepatitis C viruses.<sup>1</sup> Infections with hepatitis B virus (HBV) and hepatitis C virus (HCV) are a worldwide public health problem. In Iraq, viral hepatitis prevention and control program was started during early seventies. Many studies had been conducted to understand the prevalence of hepatitis B in the country and it was found that Iraq is of intermediate prevalence regarding type B (3.3%).<sup>2</sup> On the other hand, it was found that hepatitis B in blood donors was 3.6% in 1973, and 4.1% in 1984.<sup>2</sup> In the last 10 years, there was a decrease in the prevalence of hepatitis B to less than 1%.<sup>3</sup> The decrease in prevalence among general population is due to application of the prevention and control programs, especially safe blood transfusion and safe injections in addition to introduction of vaccination program. However, the continuous occurrence of new cases is due to the presence of reservoirs of chronically infected persons. Therefore, there is a continuous circulation of the infection in the community. This infection exposes the community to a higher risk of morbidity and mortality due to long-term complications of chronic carrier state, which might end with chronic active hepatitis, liver cirrhosis, and hepatocellular carcinoma (HCC).<sup>4</sup> In order to decrease the potential of disease transmission, the Food and Drug Administration (FDA) currently requires that all donations of whole blood and transfusable components as well as injectable plasma derivatives should be subjected to a serologic test for hepatitis B surface antigen (HBsAg), and antibody to hepatitis C virus (anti-HCV), and recommends testing for antibody to hepatitis B core antigen (anti-HBc).<sup>1</sup> Baghdad is a big city. It is the capital of Iraq with a high population density Baghdad population in 2010, is 7716960 according to the annual statistical abstract released from Ministry of planning & development cooperation, Central organization for statistics and information technology. Baghdad is divided into 2 parts by Tigris River, Karkh is the south part and Rusafa is the north part. Considering these information, the study on blood donors who donated blood from 2006-2009 in the National Blood Transfusion Center (NBTC) in Baghdad City is designed aiming to compare the prevalence rate of HBV and HCV among blood donors and compare it with the prevalence among blood donors, normal population and other risk factors in the previous years, and to determine the distribution of the cases according to age, gender, and residence.

**Methods.** This is a retrospective cross sectional observational study of blood donors from the years 2006 to 2009. Monthly reports from the NBTC

during that year were collected. This study took place at Communicable Disease Control Center (CDC), Baghdad, Iraq in January 2010. All reports from the NBTC in Baghdad including donors' age, gender, and residence for the last 4 years (from 2006-2009) were used in this study. These reports are registered and kept monthly in the NBTC archive and copies were sent to CDC, Viral Hepatitis Section.

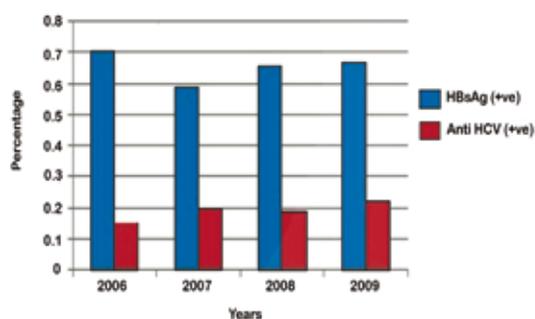
All donors were included in this study and no reports were excluded, and all donated bloods were routinely screened for HBsAg and anti-HCV using enzyme linked immune assay (ELISA), anti-HBsAb, anti-HBc Ab, and HBeAg were not part of the screening. New plans and arrangements were taken by the NBTC to introduce the recent architectural technique for screening of donors, which is more accurate. Updated Helsinki declaration was used in this study and no approval from the donors was needed as it does not involve any intervention and anonymous data were used. Most of the registered donors came from Baghdad wherein the NBTC is located. However, few donors were from other provinces.

Ethical approval from ethics committee at the NBTC was obtained in order to use the information. Excel 2007 was used for data presentation and analysis. Student's T-test and Chi square test were used when appropriate. A *p*-value less than 0.05 was considered statistically significant.

**Results.** The total number of blood donors from 2006-2009 was 495,648 (481,470 men and 14,178 women) (Table 1). The average prevalence of positive HBsAg was 0.6% in all donors, being higher in men (0.76%) than in women (0.5%) with no statistical significance (*p*=0.07) (Figure 1 & Table 1). There was no difference in the prevalence between the 4 years, although the result showed that it was higher in 2006 and lower in 2007 (Figure 1). For HBsAg, the lowest number of donors was in 2008 while the highest number was in 2006 (Table 1). The lowest number of women donors was in 2008 while the lowest number of men donors was in 2009. However, the highest numbers of men and women donors were in 2006 (Table 1) for HBsAg. On the other hand, the prevalence of positive anti-HCV was 0.3% in all donors and was significantly higher in women (0.4%) than men (0.2%) (Table 2) (*p*=0.000). Also, there was a slight increase from 2006 to 2009 and it reached up to 0.2% (Table 1). Residence and gender distribution of HBsAg positive donors are shown in Figure 2. Frequency of HBsAg and anti-HCV positive men donors was higher than HBsAg and anti-HCV positive men donors in both Rusafa and Karkh. There were no HBsAg positive women donors from Karkh /rural areas during 4 years (Figure 2). Donors from

**Table 1** - Gender distribution of hepatitis B surface antigen (HBsAg) and antibody to hepatitis C virus (anti-HCV) positive blood donors from 2006 -2009.

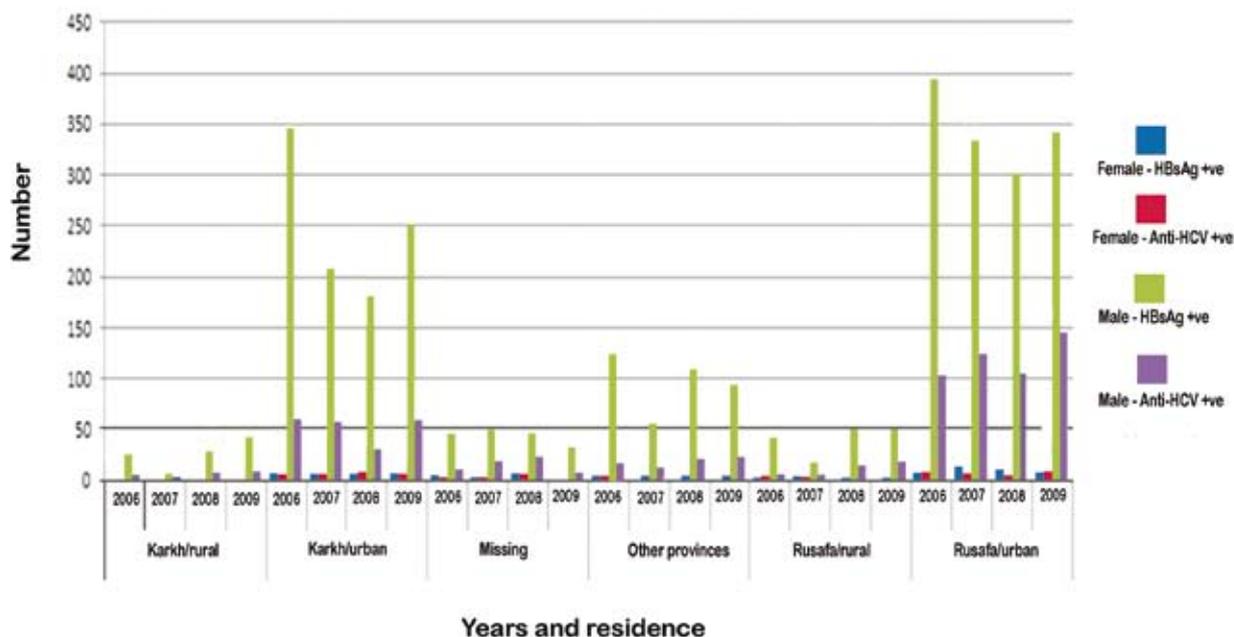
| Year              | Total donors | Gender      |               | HBsAg (+ve) donors |              | Anti HCV (+ve) donors |              |
|-------------------|--------------|-------------|---------------|--------------------|--------------|-----------------------|--------------|
|                   |              | Male donors | Female donors | Male n (%)         | Female n (%) | Male n (%)            | Female n (%) |
| 2006              | 141572       | 137486      | 4086          | 982 (0.7)          | 17 (0.4)     | 201 (0.1)             | 16 (0.4)     |
| 2007              | 117226       | 113543      | 3683          | 671 (0.6)          | 22 (0.6)     | 218 (0.2)             | 11 (0.3)     |
| 2008              | 113351       | 109983      | 3368          | 720 (0.7)          | 21 (0.6)     | 201 (0.2)             | 14 (0.4)     |
| 2009              | 123499       | 120458      | 3041          | 809 (0.7)          | 16 (0.5)     | 261 (0.2)             | 11 (0.4)     |
| Total             | 495648       | 481470      | 14178         | 3182 (0.7)         | 76 (0.5)     | 881 (0.2)             | 52 (0.4)     |
| P-value           |              |             |               | 0.069              |              | 0.000                 |              |
| Total prevalence  |              |             |               | 0.66%              |              | 0.26%                 |              |
| Male:female ratio |              |             |               | 1.4                |              | 0.48                  |              |



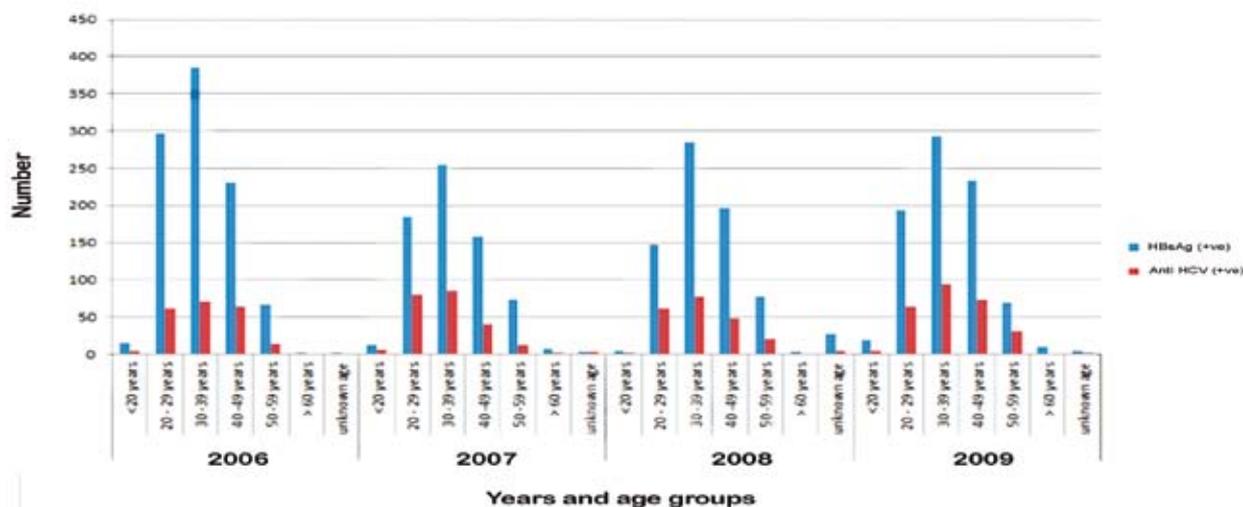
**Figure 1** - Percentage of hepatitis B surface antigen (HBsAg) and antibody to hepatitis C virus (anti-HCV) positive blood donors from 2006-2009.

other provinces were low in comparison with those from Baghdad. Age distribution of HBsAg positive and anti-HCV positive blood donors are shown in Figure 3.

**Discussion.** Surveillance of hepatitis B and C carriers are essential to assess disease impact on the population. Baseline disease levels need to be evaluated before starting any intervention strategy. Hepatitis B virus and HCV infections are major transfusion-transmissible diseases. Besides, it was noticed that transmission of viral hepatitis B and C is minimized by screening of donated blood for HBsAg and anti-HCV prior to transfusion.<sup>4</sup> Prevention and control program for viral hepatitis was started during early seventies.



**Figure 2** - Residence and gender distribution of hepatitis B surface antigen (HBsAg) and antibody to hepatitis C virus (anti-HCV) positive blood donors from 2006-2009.



**Figure 3** - Age distribution of hepatitis B surface antigen (HBsAg) and antibody to hepatitis C virus (anti-HCV) positive blood donors from 2006-2009.

One of the important strategies of such program is to test blood for HBsAg prior to donation. National Blood Transfusion Center in Baghdad has screened donated blood for HBsAg as a routine procedure since 1973. Accordingly, many studies have been conducted by Iraqi researchers during seventies and eighties in the last century to determine the prevalence of HBsAg among apparently healthy Iraqi population and blood donors. Studies in seventies showed that the prevalence in blood donors and military personnel blood donors was 3.6% and in normal population was 3.3% while in eighties it was 4.3% in normal population and 4.1% in blood donors.<sup>2</sup> This study showed a great decrease in the prevalence of HBsAg among blood donors in the last 4 years (0.6%). The epidemiology of HBV infection has decreased extensively with time. This might reflect the effects of hepatitis B prevention and control programs. In addition, it reveals that the disease is changing from intermediate endemicity (more than 2%) to low endemicity (less than 2%). Also introduction of hepatitis B vaccination program since 1993 may play part in this reduction, because many countries with successful vaccination programs have greatly reduced the incidence of HBV infection.<sup>5</sup> The prevalence of HBsAg was higher among men (0.7%) than women (0.5%) and the difference had no statistical significance ( $p=0.07$ ). Men to women ratio in regard to HBsAg positive was 1.2 which goes with the expected results, though the number of women donors is much less than men. Unexpectedly, we noticed that the carrier state decreased with age, which might be due to the fact that most of the donors were from the younger and middle age groups. Although the prevalence rates in this study was much lower than the studies carried out in Northern

Thailand and in Lao, but there is a clear similarity in the pattern when it comes to age and gender.<sup>6</sup> Hepatitis C was previously called parenteral non-A non-B hepatitis. Antibody to hepatitis C virus was discovered in late 1987.<sup>7</sup> More than 80% of HCV infected people fail to clear the virus during the acute phase of the disease and become chronic carriers.<sup>8</sup> An anti-HCV positive result indicates a past or present infection. Nevertheless, it does not differentiate between acute, chronic or past infection.<sup>6</sup> Screening blood donors for HCV was introduced in Iraq in 1995. The overall rate of anti-HCV among Iraqi blood donors in our study from 2006 to 2009 was 0.26. The prevalence among women was 0.37 while among men it was 0.18. Risk of men to women with regard to anti HCV was 0.48 and this could be explained by the low number of women donors in relation to men. This value seems to be relatively low at first glance; however, most HCV infected people will progress to chronic HCV carrier state, with all possible complications such as chronic active hepatitis, liver cirrhosis, and hepatocellular carcinoma in the future. Consequently, it renders the disease as a first communicable disease in the country. Control and prevention strategies have become of great importance since vaccine for chronic hepatitis C is unavailable. Also, treatment for such infection is very costly. Thus, from a global perspective, the greatest impact on hepatitis C disease burden will likely be achieved by reducing the risk of HCV transmission from nosocomial exposure (blood transfusion, unsafe injection practices) and high-risk behavior (injection drug use).<sup>8</sup> In other countries, several studies were also conducted on the prevalence of hepatitis in blood donors. In Egypt, the prevalence of hepatitis C showed

a value of 24.8%.<sup>9</sup> These values were much higher compared with the values obtained in this study. In Bangladesh, anti-HCV reported a prevalence of 2.4% in professional blood donors.<sup>9</sup> In the US, a study among blood donors showed an HCV prevalence of 0.40%<sup>9</sup> while in West Mexico, 0.8% of the blood donors were reported to be anti-HCV positive.<sup>9</sup> A hospital-based study in Lebanon showed that 0.4% were anti-HCV positive among blood donors.<sup>9</sup>

There are some limitations to this study, due to lack of some informations taken from donors regarding exposure to risk factors associated with the transmission of both viruses, for example, history of blood transfusion, dental extraction, surgical operation, cupping and tattooing, that were carried out within the incubation period for both viruses. However, this study may provides a useful basis for comparison for the future studies concerning the same subjects, and how addition of certain risk factors to the reports of the donors will be helpful to assess them.

In conclusions, our findings indicate that Baghdad (as the main city and capital of Iraq) is of low endemicity of HBV and HCV carrier state. Also, the finding indicates great decrease in the prevalence of the 2 types (HBV and HCV) in blood donors over the studied years in comparison with seventies and eighties in the last century. Since epidemiologic data are valuable for risk assessment, further studies are needed to provide more details on the status of HBV and HCV infections in other provinces of Iraq. This helps us to determine the most useful approaches for strengthening prevention and control activities. More information about risk factors related to hepatitis B and C from donors are recommended to be included in the donation form. Useful methods for prevention and control of HBV infection include educational program concerning the disease and its transmission routes, as well as strengthening and widening of the vaccination

program to include all risk groups in addition to the ongoing vaccination of children less than 5 years old.

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