Prevalence of Hepatitis B Virus Infection in Isfahan Province

Zary Nokhodian, Peyman Adibi1, Behrooz Ataei2

ABSTRACT

Hepatitis B virus (HBV) is a serious global health problem. It is estimated that 1.5–2.5 million people are suffering from this infection in Iran. A review on HBV infection prevalence in Isfahan, Iran is conducted in this article. It will help researchers for further studies and also will be helpful for control the infection. Medline, Embase, Ovid, Google Scholar, Scientific Information Database, Iranmedex, Magiran and Scientific Journal of Iran Blood Transfusion Organization and also students’ thesis and projects of Isfahan and Kashan universities of medical sciences were searched for key words “HBV,” “HBsAg,” “prevalence,” “Isfahan,” “Esfahan,” and “Kashan in titles and/or abstracts. Overall, 24 articles, including 4, 14, 5 and 1 were assessed in Isfahan province, and Isfahan, Kashan, and Foulad-shahr cities, respectively. The highest and lowest participants were 542705 and 73, respectively. The highest prevalence of HBsAg was reported in HIV-infected patients and the lowest one was seen in the thalassemic patients. We collected the articles about the prevalence of HBV in Isfahan to help researchers and determine prevalence HBV in Isfahan province. The similar studies in other province of Iran are necessary for marking decision.

Keywords: Prevalence, epidemiology, hepatitis B virus, Isfahan, Kashan

INTRODUCTION

Hepatitis B virus (HBV) infection is worldwide health problem with more than 2 billion people have been exposed to this infection. Fifty million new cases are being diagnosed annually with 5–10% of adults and up to 90% of infants becoming chronically infected.[1]

Chronic hepatitis B causes for about 1 million deaths each year[2] and is the 10th leading cause of death worldwide.[3]

The prevalence of HBV infection varies extensively, ranged from 0.1% to 20% in different regions of the world.[3] The prevalence of this infection is the highest in developing countries, such as in Asia, Africa and lowest in the developed countries such as North America, Europe and Australasia.[1] Overall, 45% of the world population lives in countries where HBV endemicity
is high (hepatitis B surface antigen positivity rates >8%), resulting in the massive global burden associated with the infection.

Hepatitis B virus prevalence in the general population in the Asian region is various; it is the highest rates in Taiwan (>10%) and Thailand (>8%) and lowest in Japan (0.8%), with the majority of countries having rates <8%. The Middle East: Iran, Bahrain and Kuwait have low endemicity. Iraq and the United Arab Emirates are regions of intermediate endemicity and Jordan, Oman, Palestine, Yemen, and Saudi Arabia are areas of high endemicity.

In Iran, the first report about HBV infection was published in 1972. In later reports the rate of HBV infection was from 1% to 2.1%, respectively. The prevalence of HBV has decreased in Iranian population during the last decade. The reducing the rate of infection could be achieved by vaccination programs. In Islamic Republic of Iran (I.R. Iran), the neonatal vaccination program against HBV infection started from 1993 as a national program.

More recent researches reported the range of HBV infection between 1.2% and 9.7% in different areas of the country. It is estimated that about 1.5–2.5 million people in Iran are suffering from HBV infection. In this paper, the general features of the epidemiology of HBV infection in Isfahan Province will be reviewed to help researchers for further studies and control the infection.

METHODS

The population of interest was people who live in Isfahan province and the interested outcome was the presence of positive HBsAg in blood samples of the study population, based on any blood tests. We searched eight electronic databases of biological sciences and health, including Medline, Embase, Ovid, Google Scholar, Scientific Information Database, Iranmedex, Magiran and Scientific Journal of Iran Blood Transfusion Organization. In addition, manual searches of the Iranian health sciences journals that have not been indexed in electronic databases were performed to identify all pertinent literature. The research projects of Isfahan and Kashan universities of medical sciences were also searched from their internet web sites. Iranian center for scientific documents and records (IranDoc), Isfahan and Kashan universities of medical sciences were also searched for students' thesis. For finding the gray literature, we reviewed all the national, regional and international scientific congresses and seminars that were held in the study time period with review abstract books. We also consulted with two experts in HBV researches in Isfahan (Dr. Peyman Adibi and Dr. Behrooz Ataei) and seek their personal archives for more additional citations. Finally, backward citation and forward citation of searched citations were managed. The key words were; “HBV,” “HBsAg,” “prevalence,” “Isfahan,” “Esfahan” and “Kashan in titles and/or abstracts. All articles/surveys regarding sampling design and demographic adjustments were identified by searching to November 2012.

RESULTS

Our electronic and manual searches identified 27 studies including 21 articles, five students’ theses and a research project. Two students’ theses were deleted for methodological reasons. We excluded the research project because it was running. Finally, we found 24 relevant studies of satisfactory quality for key words of “HBV,” “HBV,” “HBsAg,” “prevalence,” “Isfahan,” “Esfahan” and “Kashan.”

Fourteen studies were from Isfahan city, 5 from Kashan and 1 from Foladshahr. Other studies were from Isfahan province. All included studies were cross-sectional studies and the sample size range was between 73 and 542,705.

Prevalence of hepatitis B virus among blood donors

Seven studies were found in the literature review which related to HBV prevalence in Isfahan province. The search results are demonstrated in Table 1. Of these, five studies were conducted in Isfahan and two studies in Khaskan. In Masaeli et al. the prevalence of HBsAg was compared among regular, sporadic, and first-time blood donors (F.T.B.D) of Isfahan city. The HBsAg prevalence was less in regular than sporadic and F.T.B.D.

In a similar survey in Isfahan, Frequency of HBsAg in F.T.B.D and regular donors were 1.4%
and 0.5% respectively. In Salehi et al., blood samples of two groups of donors, routine donors and the religious ceremony donors, were evaluated for HBsAg. Their results showed HBsAg prevalence in the religious ceremony donors significantly was less than the routine conditions. HBSAg seropositivity was shown a decrease in volunteers who referred to Isfahan blood transfusion organization from 2004 to 2009 in Ebrahimian’s study.

Afzali et al. showed that the prevalence of HBsAg infection among healthy volunteer blood donors referred to the Kashan blood bank was on a significant decline from 0.82% in 2002 to 0.49% in 2007.

### Prevalence of hepatitis B virus among injecting drug users

We found five studies on prevalence HBV amongst injecting drug users (IDUs) in Isfahan province [Table 2]. Khorvash et al. and Meidani et al. assessed the frequency of hepatitis B among IDUs who admitted at Al-Zahra hospital in Isfahan during 2004–2005 (HBV prevalence: 10.9%) and 2007–2008 (HBV prevalence: 1.3%), respectively. The similar study was performed in Kashan between 2001 and 2006. In this study, the frequency of positive infection test results for males was 4% and for females was 0.5%.

Table 1: Prevalence HBV in blood donors

| Study’s first author | Study (ies) target population | Total sample size | Prevalence (%) | Sex | Year | Province/city |
|----------------------|-----------------------------|------------------|----------------|-----|------|---------------|
| Afzali               | R.B.D*                      | 43,731           | 0.62           | 39,358 | 4373 | 1996-2001 | Kashan |
| Lenjani              | R.B.D*                      | 579              | 1.73           | 523 | 56 | 1999 | Isfahan |
| Moniri               | R.B.D*                      | 600              | 0.5            | 548 | 52 | 2001-2002 | Kashan |
| Masaeli              | R.B.D*                      | 16,620           | 0.39           | 15,836 | 784 | 2002 | Isfahan |
|                      | S.B.D**                     | 5742             | 0.96           | 5315 | 427 |        |
|                      | F.T.B.D***                  | 7096             | 0.59           | 5988 | 1108 |        |
| Salehi               | R.B.D*                      | 2635             | 0.6            | - | - | 2002 | Isfahan |
| R.C.B.D****          | 2173                        | 0.18             | -              | - | - |        |
| Pourazar             | R.B.D*                      | 43,456           | 0.54           | 41,065 | 2390 | 2003 | Isfahan |
|                      | F.T.B.D***                  | 7997             | 1.4            | 6816 | 1181 |        |
| Ebrahimian           | R.B.D*                      | 542,705          | 0.36           | - | - | 2004 | Isfahan |
|                      |                             |                  | 0.3            | - | - | 2005 |        |
|                      |                             |                  | 0.22           | - | - | 2006 |        |
|                      |                             |                  | 0.14           | - | - | 2007 |        |
|                      |                             |                  | 0.13           | - | - | 2008 |        |
|                      |                             |                  | 0.11           | - | - | 2009 |        |

*R.B.D=Regular blood donors, **S.B.D=Sporadic blood donors, ***F.T.B.D=First-time blood donors, ****R.C.B.D=Religious ceremony blood donors, HBV=Hepatitis B virus

Taeri et al. evaluated seroprevalence of HBV in HIV positive patients with a history of intravenous drug users (IVDU) and showed HBV prevalence of 1.8%.

### Prevalence of hepatitis B virus among others

Eleven studies, which related to HBV prevalence in Isfahan province were found in the other population [Table 3]. The lowest and the highest samples size were 73 and 2000 for hemodialysis patients and pregnant women in Kashan, respectively. In a study carried out on 130 HIV-positive patients in this province, co-infection with HBV was 11.5%. Three studies assessed the prevalence HBV among hemophilia, and thalassemia patients. The study by Rahimi on 150 patients with hemophilia demonstrated that 2.7% patients had been infected with HBV. Kalantari et al. had reported 1.62% and 1.1% patients with hemophilia and thalassemia were HBsAg positive respectively. However, another study by Hariri et al. demonstrated that none of the thalassemic patients had been infected with HBV but the prevalence rates of HBV were 1.6% among in hemophilia patients. A study in Kashan revealed that 1.4% of hemodialysis patients were HBV positive. In a study from Kashan, HBsAg was traced in the serum of 0.35% of the pregnant
women.\textsuperscript{[28]} In another study, 1078 of the pregnant women were investigated for HBsAg and the rate of positive serum surface antigen in pregnant women was 0.5\%.\textsuperscript{[26]} In a population–based study, of the 816 participants over 6 years old of Isfahan province, 10 were positive for HBsAg.\textsuperscript{[22]} Ataei et al. have reported the prevalence rates of HBV were 3.3\% and 0.9\% among street children\textsuperscript{[24]} and Transit Heavy vehicle Drivers,\textsuperscript{[25]} respectively. HBsAg was detected in 1 (1.1\%) females who engaged in illegal sexual behavior during 2009–2010 in Isfahan.\textsuperscript{[23]} Of the 163 women incarcerated in the central prison, Isfahan 1.2\% of them were HBsAg positive.\textsuperscript{[33]}

**Risk factors for hepatitis B virus**

Of 24 studies, only one study showed a statistical significance between positive HBsAg and its risk factors. Tabasi et al.\textsuperscript{[28]} reported an association between HBsAg, family history of HBV and education level among pregnant women.

### DISCUSSION

The HBV infection is considered as a major public health problem in many countries, particularly in developing countries. HBV prevalence has decreased in Iranian population during the last decade, and now it is classified as low endemicity for hepatitis B infection.\textsuperscript{[8]} The national vaccination program for infants can be one of the causes of this decrease. In Iran the HBV vaccination started for neonates in two provinces (Zanjan and Semnan) in 1989 and then the vaccination was included in the Expanded Program on Immunization countrywide.

### Table 2: Prevalence HBV in IDUs

| Study’s first author | Total sample size | Province/city | Year | Prevalence (%) | Sex | Age (year) mean±SD |
|----------------------|-------------------|---------------|------|----------------|-----|-------------------|
| Sharif               | 200               | Kashan        | 2001-2006 | 4 (male) 0.5 (female) | 177 23 | 36.5±10.2 |
| Taeri                | 106               | Isfahan       | 2000-2007 | 1.8             | 106 - | 50.8±8.1 |
| Khorvash             | 92                | Isfahan       | 2004-2005 | 10.9            | 91 1  | 31.7±2  |
| Zamani               | 118               | Foulad-shahr  | 2008  | 0.7             | 115 3  | - |
| Meidani              | 150               | Isfahan       | 2007-2008 | 1.3             | 148 2  | 30.7±7.09 |

**HBV=Hepatitis B virus, IDUs=Injecting drug users, SD=Standard deviation**

### Table 3: Prevalence HBV in other population

| Study’s first author | Study (ies) target population | Total sample size | Province/city | Year | Prevalence (%) | Sex | Age (year) mean±SD |
|----------------------|--------------------------------|-------------------|---------------|------|----------------|-----|-------------------|
| Ataei                | HIV infected patients          | 130               | Isfahan province | 1998-2007 | 11.5            | 128 2   | 50.23±8.81 |
| Rahimi               | Hemophilic patients            | 150               | Isfahan       | 1999  | 2.7            | 131 19   | - |
| Tabasi               | Pregnant women                 | 2000              | Kashan        | 2002  | 0.35           | - 2000 24 | |
| Hashemi              | Hemodialysis patients          | 73                | Kashan        | 2000  | 1.4            | - -      | - |
| Hariri               | Thalassemic patients           | 616               | Isfahan province | 2004  | 0              | 344 272 | 15.5±8 |
| Nokhodian            | General population             | 816               | Isfahan province | 2006  | 1.3            | 388 428 | - |
| Ataei                | Street Children                | 399               | Isfahan       | 2005-2007 | 3.3            | 271 128 | 12.74±3.27 |
| Ataei                | Transit Heavy vehicle Drivers  | 235               | Isfahan       | 2007  | 0.9            | 235 -    | 41.8±9 |
| Ahmadi               | Pregnant women                 | 1078              | Isfahan province | 2009  | 0.5            | - 1078 26.1±4.9 |
| Kassaian             | Women with illegal behavior    | 100               | Isfahan       | 2009-2010 | 1.1           | - 100 30.8±9.34 |
| Kalantari            | Thalassemic patients           | 545               | Isfahan       | 2008-2010 | 1.1          | 312 233 18.7±6 |
| Nokhodian            | Female prisoners               | 163               | Isfahan       | 2009  | 1.2            | - 163 34.5±11.2 |

SD=Standard deviation, HBV=Hepatitis B virus
in 1993. After 13 years of implementation, the mass vaccination program reached 94% coverage in 2005.[10]

Despite of the reported different results in various populations, Isfahan province is classified as a low endemic region in Iran.[10] The changing epidemiologic pattern could not be compared before and after the national vaccination program in this province because there is no reported prevalence of HBV infection in Isfahan before 1993.

According to published guideline World Health Organization, serological surveys of 1st time unpaid blood donors generally offer the most useful means of estimating the prevalence of HBV infection among adults in the general population.[40] The present research shows that the overall prevalence of HBV infection among blood donors in this province has declined regardless of reported prevalence of HBV in subgroups or special periods. Similar declines in HBV infection among blood donors have been reported from other regions in Iran.[41] In Fars province, a province with low prevalence, prevalence of HBV infection decreased from 0.89% in 1998 to 0.34% in 2007 and in Sistan and Baluchestan province, a province with high prevalence, rate of HBsAg has gone down from 3.74% in 1998 to 1.15% in 2007.[41] Kafi-abad et al.[41] reported a decline in overall HBsAg prevalence rates from 1.79% to 0.41% during a period of 10 years (1998–2007) in Iran. The centralized blood transfusion system with trained staffs and better equipments, establishment of donor deferral criteria, increasing nonremunerated repeat donors and routine screening for HBV with sensitive method and kit may play important roles in the declined prevalence of HBsAg among blood donors.

According to present research, the prevalence of HBsAg among blood donors was lower than its prevalence in general population in Isfahan province in 2006.[22] It can be due to high number of repeat donors than other groups. It has been reported that repeat donors might pose a lower risk of infectious donation than F.T.B.D.

In many countries injecting drug use was related as a risk factor for hepatitis B. In Iran, the number of IDUs has increased in recent years. Amin-Esmaeili et al. have reported the prevalence rates of HBsAg were 24.7% in Tehran.[42] In a study from Kohgiloyeh and Boyerahmad province, in southwest of Iran, the prevalence of HBsAg among IDUs was 3.2%.[43] The prevalence of hepatitis B was 6.0% in intravenous drug users in Shahr-e-Kord in 2004.[44]

The prevalence of hepatitis B among patients with hemophilia in Isfahan province decreased from 2.7% in 1999[36] to 1.6% in 2004[27] and then its prevalence remains constantly till 2008.[10] Mansour-Ghanaei et al. conducted a study on 101 hemophiliacs, 27 (26.7%) were positive for HBsAg.[45] The HBsAg was positive in 4.9% among hemophilia patients in Zahedan Hemophilia Center, southeast Iran[46] All 35 patients with hemophilia who had been registered in Urmia Hemophilia Society demonstrated that none of these patients had been infected with HBV.[47]

In Isfahan province, the limited studies[27,30] were performed in thalassemic patients and is difficult that we can conclude about the changing epidemiology of HBV in these patients. However, it seems to be of great importance to pay more attention to assess prevalence of HBV in them. In a multicenter study, 732 patients with beta-thalassemia selected from five provinces of Iran. Only 11 (1.5%) were HBsAg positive.[48] In another study, the prevalence rate of hepatitis B infection in thalassemic patients of Markazi province were negative.[49] A cross-sectional study was performed on 38 thalassemic patients in South Khorasan, prevalence of HBV in these patients was zero.[50]

Two studies[26,28] performed on pregnant women in Isfahan province. These studies demonstrated, the prevalence of HBsAg among pregnant women was lower than its prevalence in women in the general population in Isfahan province in 2006.[22] Cheraghali et al. have reported the prevalence rates of HBV in pregnant women in Gorgan, Iran, (1%).

This study has some limitations especially in using standard search terms in national databases. Therefore, all synonyms of search terms separately in both Persian and English were used to overcome this problem.

**CONCLUSIONS**

Implementation program on immunization of all high-risk populations including IVDUs
and high-risk jobs such as hospital jobs and hairdressing occupations will reduce rate of HBV infection. The other effective ways of infection control are follow-up of infants with HBV infected mothers, a centralized and safe blood transfusion system and Screening HBV infection during pregnancy.

The understanding of prevalence rate of HBV in each local high-risk population will be helpful to make decision about appropriate strategies and prevention programs for control hepatitis B. Furthermore, it can help other researchers for further studies.

REFERENCES

1. Merican I, Guan R, Amarapuka D, Alexander MJ, Chutaputti A, Chien RN, et al. Chronic hepatitis B virus infection in Asian countries. J Gastroenterol Hepatol 2000;15:1356-61.
2. Alizadeh AH, Ranjbar M, Ansari S, MirArab A, Alavian SM, Mohammad K, et al. Seroprevalence of hepatitis B in Nahavand, Islamic Republic of Iran. East Mediterr Health J 2006;12:528-37.
3. Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. J Viral Hepat 2004;11:97-107.
4. Kowdley KV. The cost of managing chronic hepatitis B infection: A global perspective. J Clin Gastroenterol 2004;38:S132-3.
5. André F. Hepatitis B virus epidemiology in Asia, the Middle East and Africa. Vaccine 2000;18 Suppl 1:S20-2.
6. Sadi S, Farrohi K, McCollum RW, Le Bouvier GL. Hepatitis-B antigen in Iran: Frequency and subtype. Lancet 1972;2:1377-8.
7. Tabarestani M, Hoofnagle JH, Afkari A. Type B hepatitis in Iran. Acta Med Iran 1977;20:105-10.
8. Alavian SM, Fallahian F, Lankarani KB. The changing epidemiology of viral hepatitis B in Iran. J Gastrointestin Liver Dis 2007;16:403-6.
9. Alavian M. Ministry of Health in Iran is serious about controlling hepatitis B. Hepat Mon 2007;7:3-5.
10. Alavian M, Hajarizadeh B, Ahmadzad-Asl M, Kabir A, Lankarani KB. Hepatitis B virus infection in Iran: A systematic review. Hepat Mon 2008;8:281-94.
11. Bayat-Makou J, Shahmazi A, Koushavar H. Prevalent infections in North-West region of Tabriz. Med J Tabriz Univ Med Sci 2003;59:29-32.
12. Abdolahi N, Keshhtkar AA, Semnani S, Roshandel GR, Besharat S, Joghahani HR. HBV seroprevalence among golestan adults. Iran J Epidemiol 2006;4:35-40.
13. Afzali H, Taghabi Ardakani A, Vali G. Seroepidemiology of hepatitis B and C in blood donors in Kashan, 1996-2001. Feyz 2001;6:43-50.
14. Moniri R, Mosayebii Z, Mossavi GA. Seroprevalence of cytomegalovirus, hepatitis b, hepatitis c and human immunodeficiency virus antibodies among volunteer blood donors. Iran J Public Health 2004;33:38-42.
15. Masaeli Z, Jaberi M, Maghsudlu M. A comparison of seroprevalence of blood-borne infections among regular, sporadic and first-time blood donors in Isfahan. Blood 2006;2:301-7.
16. Salehi H, Salehi M, Ardestani M, Khorvash FF, Zadeh KM. Comparing the blood safety on the blood donors within the religious ceremonies and routine conditions. J Isfahan Med Sch 2011;28:1774-80.
17. Taeri K, Kasaeani NN, Nobari RF, Ataei B. The prevalence of hepatitis B, hepatitis C and associated risk factors in intravenous drug addicts (IVDA) with HIV in Isfahan. J Isfahan Med Sch 2008;26:273-8.
18. Sharif M, Sheriff A, Sayyah M. Frequency of HBV, HCV and HIV infections among hospitalized injecting drug users in Kashan. Indian J Sex Transm Dis 2009;30:28-30.
19. Zamani S, Radfar R, Nematollahi P, Fadaiie R, Meshkati M, Mortazavi S, et al. Prevalence of HIV/ HCV/HBV infections and drug-related risk behaviours amongst IDUs recruited through peer-driven sampling in Iran. Int J Drug Policy 2010;21:493-500.
20. Khorvash F, Dastjerdi M, Naeini AE. Paraclinical disorders and prevalence of viral infections in injection drug users. J Qazvin Univ Med Sci 2009;13:23-9.
21. Ataei B, Tayeri K, Kassaian N, Farajzadegan Z, Babak A. Hepatitis B and C among patients infected with human immunodeficiency virus in Isfahan, Iran: Seroprevalence and associated factors. Hepat Mon 2010;10:188-92.
22. Nokhodian Z, Kassaian N, Ataei B, Javadi A, Shoaei P, Farajzadegan Z, et al. Hepatitis B markers in Isfahan, central Iran: A population-based study. Hepat Mon 2009;9:12-6.
23. Kassaian N, Ataei B, Yaran M, Babak A, Shoaei P. Hepatitis B and C among women with illegal social behavior in Isfahan, Iran: Seroprevalence and associated factors. Hepat Mon 2011;11:368-71.
24. Ataei B, Nokhodian Z, Babak A, Shoaei P, Zadeh MM, Sadeghi S. Seroprevalence and associated risk factors of hepatitis b virus among street children in Isfahan, Iran. J Isfahan Med Sch 2010;27:788-97.
25. Ataei B, Ansari M, Yaran M, Nokhodian Z, Nejati H, Farajzadegan Z, et al. The prevalence of hepatitis b, hepatitis c and their risk factors in transit heavy vehicle drivers in Isfahan, Iran. J Isfahan Med Sch 2009;26(Suppl):468-75.
26. Ahmadi M, Toghyani R, Shahidi S, Izadi M, Merasi MR, Agdak P, et al. Prevalence of HBsAg and high-risk
behaviors in pregnant women reffring to Urban Health Centers in Isfahan province. Iran J Nurs Midwifery Res 2011;16:47-54.

27. Hariri MM, Akbari N, Yavari F, Javadi E, Javer S. Prevalence of hepatitis B, C and HIV markers in thalassemic and haemophilic patients in Isfahan, 2004. Blood 2006;2:201-4.

28. Tabasi Z, Mirhosseini F, Mousavi G, Ghafouri L. HBsAg in parturients referring to gynecologic clinics in Kashan, 2002. Feyz 2003;7:35-41.

29. Meidani M, Farzaneh S, Ajami A, Hassanzade A. Seroprevalence of HTLV1,2 virus among injection drug addicts in Isfahan, 2007-2008. J Shahid Sadoughi Univ Med Sci 2009;17:286-90.

30. Kalantari H, Baghi AM, Akbari M, Kalantari M, Shahshahan Z. Hepatitis C and B in blood transfusion recipients indentified at Isfahan province. J Isfahan Med Sch 2011;29:615-20.

31. Pourazari A, Akbari N, Hariri M, Yarari F, Akbari Sh. Evaluation of demographic profiles and prevalence of major viral markers in first time vs repeat blood donors in Isfahan. Blood 2006;2:323-9.

32. Ebrahimi Z, Fazilati M, Akbari N, Hariri M, Fatehifar M. Correlation of deferral rate with the frequency rate of viral markers of HBV, HCV and HIV in blood supplies during 2004-2009. Blood 2011;8:130-6.

33. Nokhodian Z, Yazdani MR, Yaran M, Shoaei P, Mirian M, Ataei B, et al. Prevalence and risk factors of HIV, syphilis, hepatitis B and C among female prisoners in Isfahan. Hepat Mon 2012;12:442-7.

34. Lenjani A. Prevalence of hepatitis B and C infection among blood donors in Isfahan in 1999. Isfahan, Iran: Isfahan University of Medical Sciences; 1999.

35. Hashemi M. Prevalence of hepatitis C and hepatitis B and HIV infection among hemodialysis patients in Kashan hospital in 2000. Kashan, Iran: Kashan University of Medical Sciences; 2002.

36. Rahimi H. Prevalence of hepatitis B and C in hemophilia patients in Isfahan in 1999. Isfahan, Iran: Isfahan University of Medical Sciences; 2000.

37. Kamalian S. Epidemiology of HBV in HBsAg+patients in Kashan hospital in 2004. Kashan, Iran: Kashan University of Medical Sciences; 2004.

38. Nayebozadeh M. Prevalence of hepatitis B in pregnant women in Isfahan. Isfahan, Iran: Isfahan University of Medical Sciences; 1991.

39. Heravi M. The assessment of anti HCV, anti HIV and anti HBV seroprevalence in IVDU in Kashan in 2008. Kashan, Iran: Kashan University of Medical Sciences; 2008.

40. World Health Organization. “Introduction of hepatitis B vaccine into childhood immunization services: Management guidelines, including information for health workers and parents.” (2001). Available from: www.who.int/vaccines-documents.

Source of Support: Nil. Conflict of Interest: None declared.