

*Research Paper*

## **Prevalence of HBV, HCV and HIV and Anti-HBs Antibodies Positivity in Healthcare Workers in Departments of Surgery in Duhok City, Kurdistan Region, Iraq**

**Nawfal R. Hussein**

The Department of Internal Medicine, Faculty of Medical Science, School of Medicine, University of Duhok, Duhok, Kurdistan Region, Iraq

Corresponding author, e-mail: (Nawfal.hussein@yahoo.com)

(Received: 8-12-14; Accepted: 18-1-15)

---

**Abstract:** *Healthcare workers are at high risk of blood borne infections especially Hepatitis B virus (HBV), Hepatitis C virus (HCV) and human immunodeficiency virus (HIV). Such an infection may progress to serious consequences. The aim of this study was to determine the prevalence of HBV, HCV and HIV in all health workers in departments of Surgery in Azadi teaching hospital in Duhok. Anti-HBs antibody positivity was also determined in healthcare workers who gave history of immunisation. 192 subjects were involved in this study and ELISA was done to determine the HBs antigen, HCV antibodies and HIV positivity. Anti-HBs antibodies were also determined in vaccinated staff. None of the subjects included in this study tested positive to HCV antibodies (AB) and HIV. One male doctor showed positive test for HBs Ag (0.5%). The levels of anti-HBs antibodies were studied in 191 staff, 32/191 (15.5%) of our subject tested negative for anti-HBs antibody despite the history of vaccination. 12/115 (8.7%) of the female included in this study tested negative for anti-HBs antibody, while 20/76 (25.9%) of the males were negative ( $p=0.002$ ). More research is needed to study the prevalence rate with a larger sample size and the inclusion of more than one centre.*

**Keywords:** HBV, HCV, HIV, Anti HBs AB, Iraq.

---

## 1. Introduction

Healthcare workers are exposed to the hazards of blood borne infections specially HBV, HCV and HIV (CDC 2001). Infection with such viruses is associated with significant morbidity and mortality. In addition, infection with these viruses is associated with psychological and occupational consequences. HBV, HCV and to a lesser extent HIV can be acquired through occupational exposure to contaminated blood and body fluids and healthcare workers can in turn transmit the virus to their families and patients as well (CDC 2001).

CDC estimated that 14.4% and 1.4% of healthcare workers, including dentists, doctors and nurses, are infected with HBV and HCV, respectively (CDC 2001). Also, CDC reported about 60 healthcare workers who acquired HIV infection after occupational exposure (CDC 2001). In India, only few healthcare related HIV cases have been reported (CDC 2001; Wanchu *et al.*, 2006).

Blood borne infections can be prevented by universal precaution guidelines protecting both healthcare staff and patients from blood borne infections in health care settings (Elseviers *et al.*, 2014). Using personal protective equipment (PPE), such as gloves, gowns, and masks, is the fundamental part of standard precautions for preventing blood borne infections. Needle recapping has been reported to be a risk factor for needle-stick injuries and must be included in the preventive measures (Elseviers *et al.*, 2014).

Pre exposure and post exposure prophylaxis play a major role in disease prevention. This applies to blood borne infection as well (CDC 2001; Hall 1993; Moloughney 2001). Unfortunately, no pre exposure prophylaxis is available for the prevention of HCV and HIV. HBV can be prevented through pre exposure vaccinations and it is nowadays a must for all healthcare staff (Moloughney 2001). Also, immunoglobulin is available for HBV post exposure prophylaxis (Moloughney 2001). For HIV post exposure prevention, a short course of antiretroviral therapy is given. Healthcare workers who have been exposed to HCV must be followed up and treatment with interferon should be started as soon as possible with excellent cure rate (Moloughney 2001).

The aim of this study was to determine the prevalence of HBV, HCV and HIV in all health workers in department of Surgery Azadi teaching hospital in Duhok. Anti-HBs antibodies positivity was determined in healthcare workers who gave history of immunization.

## 2. Materials and Methods

### Study Location

This project was conducted at one hospital in Duhok city, Kurdistan region, Iraq, namely Azadi teaching hospital. This hospital is the main hospital in the city which provides services for around million people.

### Study Sample

All the staff including nurses and doctors who work in department of surgery and related departments were included in this study. The total number was 192 staff with more than six months of work experience were included in this project.

### Inclusion Criteria

All the members of the department of surgery and related departments (including ENT, ophthalmology, gynecology) who have been working for more than 6 months and have no previous history of HBV, HCV and HIV were included in this study. For studying the anti-HBs antibodies, all

staff who completed the vaccination schedule at least one month before conducting the study were included.

## Elisa

The HIV (Ag and AB combo), the HCV AB (fourth generation), the hepatitis B-specific HBe antigen, HBe antibodies, HBcore (HBc) IgG and IgM were studied by commercial DIA.PRO diagnostic Bioprobes ELISA kit (Italy) following manufacturer's instruction.

## DNA Extraction and RTPCR

DNA extraction was conducted using QIAamp Viral DNA Extraction Kit (Qiagen, GmbH) according to manufacture instructions for automatic extraction in QIAcube extractor (Qiagen, GmbH). The extracted DNA concentration was confirmed through measurement by nanodrop. HBV-DNA was quantified by artus HBV RG PCR based real time PCR (Qiagen) as described per manufacturer instructions. Reactions were analyzed by Rotor-Gene Q Real Time PCR. To test the performance of our primers and probes in real time PCR, we used  $10^6$ ,  $10^5$ ,  $10^4$ ,  $10^3$  and  $10^2$  copies of HBV-DNA.

## Statistical Assessment

Data analysis was conducted by Minitab 15 software. The chi-squared was used for the analytical assessment and a p-value of  $\leq 0.05$  was considered statistically significant.

## 3. Results and Discussion

### HBs Ag, HCV AB and HIV Positivity

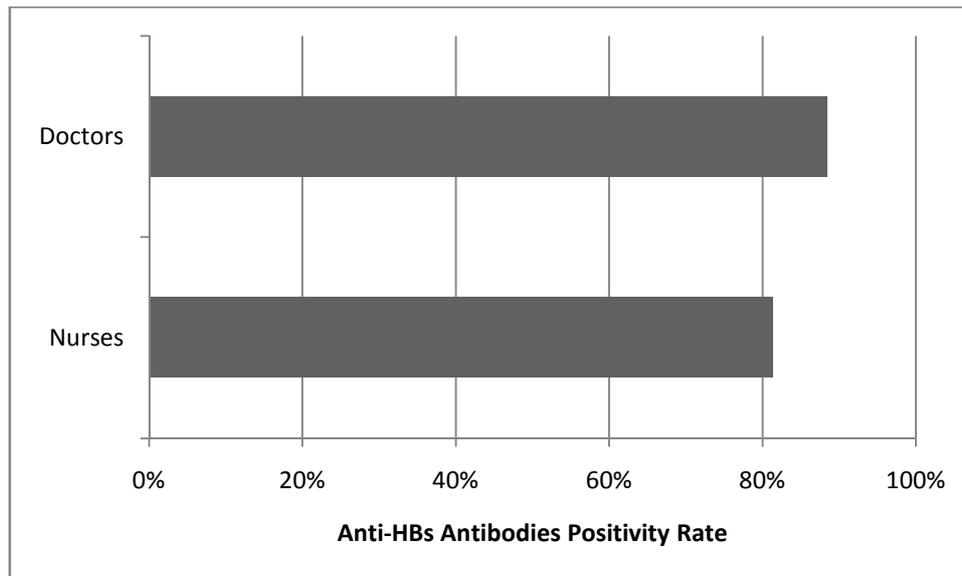
In this study, 53 doctors and 139 nurses were included. 77 were male and 115 were female. None of the subjects included in this study tested positive to HCV AB and HIV. One male doctor showed positive test for HBs Ag (0.5%).

### Anti-HBs Antibodies

One male doctor showed positive test for HBs Ag and therefore he was excluded from the study. For this, titers of anti-HBs  $< 10$  mIU/mL were considered negative. Overall, 32/191 (15.5%) of our subject tested negative for anti-HBs antibody. 12/115 (8.7%) of the female included in this study tested negative for anti-HBs antibody, while 20/76 (25.9) of the males were negative ( $p=0.002$ ). 6/52 (11.5%) doctors tested negative while 26/139 (18.7%) nurse tested negative ( $p=0.2$ ). 29 of the subjects (including 12 females and 17 males) were partial responder and showed a titer between 10-100 mIU/mL.

**Table 1:** Anti-HBs antibodies levels in healthcare workers in department of surgery, Azaditeaching hospital

Gender	Anti-HBs Antibodies mIU/mL		
	less than 10	10-100	more than 100
Male (No.)	20	17	39
Female (No.)	12	12	91
Total	32	29	130



**Fig 1:** The percentage of anti-HBs antibodies positivity in nurses and doctors working in department of surgery, Azadi teaching hospital

### RTPCR and Other HBV Profile

To determine the viral load for the subject with HBsAg positive, RTPCR was performed. It showed that the viral load of this subject was 1000IU/ml. Also the patient showed IgM negative and IgG positive HBc AB. The subject also tested negative for HBe Ag and positive for HBe AB.

Healthcare workers are at high risk of blood borne viral infections especially HBV, HCV and HIV (CDC 2001). Doctors with different specialties and nurses working in different departments are at high risk of acquiring the infection. Healthcare workers may acquire the infection by conducting hazardous and unsafe practices that may result in injuring the skin or splash into mucous membrane (Moloughney 2001). Excessive injections, improper waste disposal and needle recapping are the major blood-borne infection risk factors in the third world countries (CDC 2001; Moloughney 2001). Many factors play roles in the transmission of these viruses from patients to healthcare workers including the type of exposure, the depth of injury, the type of fluid and the viral load (CDC 2001; Moloughney 2001). In one study, it was shown that dentists carried the highest prevalence rate of HBV infection, while others found that nurses were at the highest risk followed by physicians (Singhal *et al.*, 2009). The prevalence of healthcare workers infected with HBV varies from country to another depending upon the prevalence of HBV in the community and the implementation of infection control precautions. In a study conducted in Pakistan, it was shown that 2.18% of the medical staff were positive for HBs Ag (Attaullah *et al.*, 2011). In another study conducted in Korea, it was found that the positivity rate for HBsAg was 2.4% (Shin *et al.*, 2006). Lower prevalence rate was found in our study as 0.5% of the staff included were HBs Ag positive. More research is needed to study the prevalence rate with a larger sample size and the inclusion of more than one centre. One male doctor showed positive result for HB Ag. The study of the HBV profile in this case showed that he is chronically infected (HBC IgG positive) with low infectivity profile (negative HBs Ag with positive HBe AB). In addition, RTPCR of this subject showed a very low viral load therefore he was allowed to continue his work and urged to repeat the test every 6 months.

HCV infection can predispose to severe medical conditions such as cirrhosis and hepatocellular carcinoma (Khan *et al.*, 2011). Annually, there are about million new cases of HCV worldwide most of whom acquire the infection after the exposure to sharp contaminated devices. 3% of the healthcare workers reported exposure to blood or body fluid contaminated with HCV (Prüss-Üstün *et al.*, 2005).

In our study, none of our subject tested positive for HCV. This is in agreement with a study conducted in Iran where none of the staff included in that study found to be positive for HCV antibodies (Shoaei *et al.*, 2012). Healthcare workers can also acquire HIV infection after occupational exposure to HIV-contaminated blood and body fluids. In the USA, there are about 60 cases of HIV infection acquired after occupational exposure (CDC 2001). In India, few cases only have been reported (Wanchuet *et al.*, 2006). All our staff showed negative results for HIV. This might be due to low risk of exposure to this virus as HIV is very rare in Duhok city.

The HBV vaccination coverage rate varies from a country to another. WHO has estimated the coverage rate between 18% in some African countries to more than 70% in the USA and Australia (Hutin *et al.*, 2003). In our study, all the staff included in the research were vaccinated and this high coverage rate returns back to previous two campaigns to vaccinate the staff conducted in the target hospital. Hence, the coverage rate in this study may not reflect the real coverage rate and more study is needed to include other hospitals and health centres. HBV infection can be prevented by vaccination and after finishing the vaccination schedule 95% of vaccinees showed adequate antibodies levels to prevent the infection (WHO, 2009). In a study conducted in Egypt, it was found that 93% and 80% of children aged 2-< 4 years, 4-13 years achieved the protective levels of anti-HBs antibodies after the completion of vaccination. In the same study, it was shown that 79% adults acquired the protective levels of ant-HBs antibodies. In another study conducted in Taiwan, it was shown that single dose of vaccine boosted the immune response in almost all individuals (Lu *et al.*, 2004). In a study conducted in Gambia, it was shown that vaccination program is highly effective in preventing HBV infection and subsequent complications (Viviani *et al.*, 2008). In our study we found that the protective anti-HBs antibodies levels were achieved in about 85% of vaccinated staff. In agreement with a study conducted in Saudi, we found that protective antibodies levels were achieved in females more than males. These results are difficult to explain and more research is needed to explore this (Al Ghamdi *et al* 2013). 29 of our subjects showed partial response to the vaccine and hence boosting dose was needed.

#### 4. Conclusion

In this study, one male doctor showed positive test for HBs Ag. The levels of anti-HBs antibodies were studied in 191 staff, nearly 85% of the vaccinated staff showed protective levels of antibodies. Also we showed that the rate of female achieving protective levels of anti-HBs antibody was significantly higher than that found in male staff. More research is needed to study the prevalence rate with a larger sample size and the inclusion of more than one centre.

#### Acknowledgements

The authors reported no conflicts of interest and no funding was received for this work.

#### References

- [1] S.S. Al Ghamdi, H.I. Fallatah, D.M. Fetyani, J.A. Al-Mughales and A.T. Gelaidan, Long-term efficacy of the hepatitis B vaccine in a high-risk group, *Journal of Medical Virology*, 85(9) (2013), 1518-1522.
- [2] S. Attaullah, S. Khan, S. Naseemullah, S. Ayaz, S.N. Khan and I. Ali et al., Prevalence of HBV and HBV vaccination coverage in health care workers of tertiary hospitals of Peshawar, Pakistan, *Virology Journal*, 8(2011), 275.
- [3] CDC, Updated U.S. public health service guidelines for the management of occupational exposures to HBV, HCV and HIV and recommendations for postexposure prophylaxis, *MMWR*, June 29 (2011), 1-42, 2001/50(RR11), Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5011a1.htm> Accessed 24/10/2014.

- [4] M.M. Elseviers, M. Arias-Guillén, A. Gorke and H.J. Arens, Sharps injuries amongst healthcare workers: Review of incidence, transmissions and costs, *Journal of Renal Care*, 40(3) (2014), 150-156.
- [5] A.J. Hall, Hepatitis B, vaccination: Protection for how long and against what? *BMJ*, 307(6899) (1993), 276-277.
- [6] Y. Hutin, A. Hauri, L. Chiarello, M. Catlin, B. Stilwell and T. Ghebrehiwet et al., Best infection control practices for intradermal, subcutaneous and intramuscular needle injections, *Bull World Health Organ*, 81(7) (2003), 491-500.
- [7] S. Khan, S. Attaullah, S. Ayaz, S.N. Khan, S. Shams and I. Ali et al., Molecular epidemiology of HCV among health care workers of khyberpakhtunkhwa, *Virology Journal*, 8(1) (2011), 105.
- [8] C.Y. Lu, B.L. Chiang, W.K. Chi, M.H. Chang, Y.H. Ni and H.M. Hsuet al., Waning immunity to plasma-derived hepatitis B vaccine and the need for boosters 15 years after neonatal vaccination, *Hepatology*, 40(6) (2004), 1415-1420.
- [9] B.W. Moloughney, Transmission and postexposure management of bloodborne virus infections in the health care setting: Where are we now? *Canadian Medical Association Journal*, 165(4) (2001), 445-451.
- [10] A. Prüss-Üstün, E. Rapiti and Y. Hutin, Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers, *American Journal of Industrial Medicine*, 48(6) (2005), 482-490.
- [11] B.M. Shin, H.M. Yoo, A.S. Lee and S.K. Park, Seroprevalence of Hepatitis B virus among health care workers in Korea, *J Korean Med Sci*, 21(1) (2006), 58-62.
- [12] P. Shoaei, N. Lotfi, R. Hassannejad, M. Yaran, B. Ataei and N. Kassaian et al., Seroprevalence of Hepatitis C infection among laboratory health care workers in Isfahan, Iran, *Int J Prev Med.*, 3(Suppl1) (2012), S146-S149.
- [13] V. Singhal, D. Bora and S. Singh, Hepatitis B in health care workers: Indian scenario, *J Lab Physicians*, 1(2) (2009), 41-48.
- [14] S. Viviani, P. Carrieri and E. Bah, 20 years into the Gambia Hepatitis intervention study: Assessment of initial hypotheses and prospects for evaluation of protective effectiveness against liver cancer, *Cancer Epidemiol Biomarkers Prev*, 17(11) (2008), 3216-3223.
- [15] A. Wanchu, S. Singh, P. Bambery and S. Varma, Possible occupationally acquired HIV infection in two Indian healthcare workers, *Med Gen Med.*, 8(2) (2006), 56.
- [16] WHO, Hepatitis B vaccines: WHO position paper, *Weekly Epidemiol Record*, 84(40) (2009), 405-419.