International Journal of Research and Development in Pharmacy and Life Sciences
Available online at http//www.ijrdpl.com
August - September, 2016, Vol. 5, No.5, pp 2307-2310
ISSN (P): 2393-932X, ISSN (E): 2278-0238

Research Article

ANTIBODY TO HEPATITIS B SURFACE ANTIGEN IN VACCINATED HEALTH CARE WORKERS

Anupriya A, Priyanka N, Vallab Ganesh, Uma A

Department of Microbiology, Chennai Medical College Hospital and Research Centre (SRM Group), Tiruchirapalli, India.

***Corresponding author's Email:** dranupriya03@yahoo.in

(Received: June 09, 2016; **Accepted:** July 15, 2016**)**

ABSTRACT

Objectives: HBV vaccination leads to both humoral and cellular immune response and can be evaluated using HBs- specific antibodies.
Methods: Cross-sectional study was carried out at tertiary care hospital. A total 120 HBV vaccine compliant HCW were evaluated for quantitative anti-HBs by enzyme immune assay.
Results: 110 (91.7%) subjects had protective levels of anti-HBs. Higher age at vaccination was an important risk factor in low vaccine response. Doctors had higher levels of anti-HBs titres when compared to laboratory technicians and staff nurse.
Conclusion: We recommend that all HCWs should undergo 'initial anti-HBs' assay within one to three months (less than six months) of last dose of primary vaccination .HCW having initial anti-HBs titers of less than 10 mIU/ml should be investigated for HBV infection and if negative, they should be offer second HBV vaccination series.
Keywords: Anti-Hepatitis B surface antigen; Health care workers; Hepatitis B virus vaccine.

INTRODUCTION

Hepatitis B virus (HBV) infection is a well recognized Occupational risk for health care workers (HCW). The high risk of chronicity and its association with hepatocellular carcinoma is of public health importance. Because of the high risk of HBV infection among health care workers, routine pre-exposure vaccination of health care workers against Hepatitis B & the use of universal precautions to prevent exposure to blood and potentially infectious body fluids have been recommended in many countries[1].

The risk of HBV in an unvaccinated person after a single episode of needle prick injury ranges from 6 - 30%[1] and even 0.00001ml of blood can transmit HBV[2]. Vaccination is an easy and cost effective measure to prevent disease and infection, since it eliminates persistent HBV infection, diminishes the pool of carrier state[3]. A complete standard vaccination consists of 3 doses, administered as 0, 1, and 6 month schedule. This induces protective antibody concentrations >90% healthy adults [4,5].

An individual immune response to vaccine after primary immunization is not uniform. HBV vaccination leads to both humoral and cellular immune response and can be evaluated using HBs specific antibodies[5,6]. The knowledge of immunogenicity of hepatitis B vaccine in HCW is still insufficient. Hence this study aims in evaluating the vaccine efficacy after primary immunization among HCWs.

MATERIALS AND METHODS

Setting of the study & Study design:

This is a cross-sectional analytical study, carried out on 120 health care workers in a tertiary care Teaching hospital, South India. The target population comprise of consultant doctors, interns, nurses, laboratory technicians. Medical officers selected consisted of staffs from various speciality areas including Surgery, Accident and Emergency, Internal Medicine, Anesthesia, Obstetrics and Gynecology and Pediatrics in this hospital.

Those health care workers who have been vaccinated against hepatitis B will be included in the study. Staff nurse with minimum work experience of 3 years will be included in this study. Those health care workers who have not been vaccinated against HBV will be excluded. Purpose of the study was explained to each health care worker and informed written consent was obtained from them before getting enrolled in this study.

Structured Questionnaire

A self administered questionnaire which included demographic details, employment history, history of vaccination against HBV, how long before, history of clinical hepatitis B and potential exposure to blood transfusion or frequency of needle stick injuries etc. was collected from the participants of study.

Screening

About 5ml of blood was collected under strict aseptic technique. Sera were separated by centrifugation at 3000 rpm for 5minutes and stored at -20^{0}C till the time of testing. Hepatitis b surface antigen (HBsAg) and antibodies to hepatitis B surface antigen(anti-HBs) was carried using Immunochromatography and third generation enzyme immunoassays. All the positive samples were being tested in duplicate. Those who showed titre value less than the cut-off was given a single dose of HBV vaccine and retested for AntiHbS using the same ELISA kit.

Statistics

Data was analyzed using version17.0 of the Statistical Package for the Social Sciences (SPSS).Associations between categorical variables was assessed using chi-square tests.

RESULTS

Of the total 120 HCW tested, 59 males and 51 females had anti-HBs positivity while the remaining 6 males and 4 females had decreased titres; hence anti-HBs negative (Table 1).

Table 1: Gender and AntiHBs status

Status	Male	Female	Total
Vaccinated	65	55	120
Anti HBs positive	59	51	110
Anti Hbs Negative	6	4	10

Among the subjects included, the maximum subjects showed anti-HBs positive are found in between the age group of 20 to 25 followed by 26 to 30 (Table 2).

Table 2: Age of primary vaccination and anti -HBs status

Age (in years)	HBs Ag (+)	Anti-HBs (+)	Anti- HBs (-)	Total
20-25	-	66	-	66
26-30	-	23	3	26
30-35	-	17	6	23
>35	-	4	1	5
Total	-	110	10	120

Of the 120 persons tested, in the age group 20-25yrs, all 66 of them had adequate titres, when compared to age group 26-30, 30-35yrs, >35 yrs where 23, 17, 4 persons had anti-HBs positivity respectively. The remaining 3,6,1 persons of the age group 26-30, 30-35yrs, > 35 years had negative anti-HBs titres. Among the participants, nobody tested positive for HBs antigen.

Table 3: Occupation of the Health care worker and Anti-HBs

S. No	Occupation	Anti-HBs (+)	Anti-HBs (-)
1	Medical Students	40 (100)	-
2	Junior Residents	11 (91.7)	1 (8.3)
3	Consultants	34 (94.4)	2 (5.6)
4	Laboratory Technicians	7 (70)	3 (30)
5	Staff Nurse	18 (81.8)	4 (18.2)
	Total	110 (91.7)	10 (8.3)

[Figure in parenthesis denoted percentages]

Of the total 120 HCW tested for anti-HBs, 40 (100%) medical students, 11 (91.7%) Junior residents, 34 (94.4%) Consultants, 7 (70%) Laboratory Technicians, 18 (81.8%) Staff nurse had anti-HBs (+) titres whereas 1 (8.3%) junior

resident, 2 (5.6%) Consultants, 3 (30%) Laboratory technicians, 4 (18.2%) staff nurse had anti-HBs(-) titres.

Table 4: Quantification of Anti-HBs titre

No of vaccine recipients	<10m IU/ml	11-100m IU/ml	>100m IU/ml
3 doses (n=83)	2 (2.5)	27 (32.5)	54 (65)
< 3 doses (n=37)	8 (21.6)	24 (64.9)	5 (13.5)
Total (n=120)	10 (8.3)	51 (42.5)	59 (49.2)

[Figure in parenthesis denoted percentages]

Of the total 120 participants of study, 83 of them had completed vaccination (3 doses) and the remaining 37 had incomplete vaccination. Of the 83, 54 (65%) had anti-HBs >100mIU/ml, 27 (32.5%) had anti-HBs 11-100mIU/ml, 2 (2.5%) had <10mIU/ml. Among 37 people who received incomplete vaccination, 5 (13.5%) had anti-HBs >100mIU/ml, 24 (64.9%) had anti-HBs 11-100mIU/ml, 8 (21.6%) had anti-HBs <10mIU/ml respectively.

DISCUSSION

Health care workers (HCW) in developing countries have the highest burden from exposure to contaminated sharps leading to infections1,4. The protective efficacy of hepatitis B vaccination is directly related to the development of antibody to Hepatitis B surface antigen (anti-HBs). In the present study 91.7% of HCW had protective levels of anti-HBs, which is comparable to the study done in Srilanka (91.2%) and Hyderabad (88.2%)[6,7]. Previously HBV vaccination coverage was low, but after the emphasis of OSHA guidelines, awareness regarding HBV infection and vaccination has increased tremendously[6,7,8].

In the present study, there was no statistical significance regarding gender among anti-HBs positivity, but some differences exist between anti-HBs negative titres[9,10]. This could be due to hormonal influences. In this study as age increases the titre level decreases, failure to response to HBV vaccine as age increases shows that, this group of population had not undergone titre testing and had not received a booster dose10. Other studies also reported higher age as the most important factor in reduced immunogenicity of HBV vaccine[10,11].

Among the HCW's, medical students, junior residents and consultants had higher rate of Anti-HBs positivity when compared to laboratory technicians and staff nurses[11]. Hepatitis B is a well – documented occupational hazard for health care workers, including both laboratory and nursing personnel. The main reasons for non immunisation differ widely among the different cadres of health workers[12,13].

The present study reports that the main causes of non-immunisation among paramedical workers is due to lack of proper knowledge regarding Occupation transmitted infections, lack of motivation, high cost of the vaccine and other causes[12,13,14]. A Taiwan study indicated that the concern about the efficacy of Hepatitis B vaccine, fear of pain from repeated injections, time and money were the main determinants among the nursing faculty for not having the immunisation for hepatitis B[14].

Generally the protective level of anti HBs is considered as >10 mIU/mL, but some countries like UK recommend as >100 mIU/mL. In the present study minimal protection level of 10mIU/ml is considered. Of the 120 HCW included in the study, 83 HCW had received complete course of immunisation and of which 81, of them had protective titre levels, 37 recipients had received incomplete course of immunisation This poor compliance may be attributed to lack of awareness, multiple doses, prolonged duration to complete the course, high cost and personal reasons like movement, pregnancy and other illness[8,9,14,15].

Of the 120, 10 (8.3%) HCW had in-adequate (anti-HBs <10mIU/ml) titres. They were given a single booster dose and re-testing was done after 2 months as per CDC guidelines. Of the 10, only 7 HCW had received a booster dose, the remaining three could not be followed up. Among the 7 HCW, 6 had the minimal protective titre (10mIU/ml) and one HCW did not attain the titre. We could not label them as non-responders/ hypo-responders because different studies have demonstrated that a small proportion of healthy individuals receiving the hepatitis B (HB) vaccine do not produce protective levels of anti-HBs antibody, a phenomenon which could be linked to certain human leukocyte antigen (HLA) class-II alleles or haplotypes[11,12].

We recommend that all HCWs should undergo 'initial anti-HBs' assay within one to three months (less than six months) of last dose of primary vaccination[6,9,10]. HCW having initial anti-HBs titers of less than 10 mIU/ml should be investigated for HBV infection and if negative, they should be offer second HBV vaccination series. 30% of such individuals

seroconvert after second series of HBV vaccination[6,7]. HCW not having HBV infection and not responding to second series of HBV vaccination should be diagnosed as true HBV vaccine Non-Responder[13].

The NHMRC currently recommends that at-risk individuals be revaccinated every 5 years, without a retest for anti-HBS titres[13,15,16]. Some suggested that it may be necessary to revaccinate high-risk hypo-responders more frequently than the currently recommended 5 years interval. Recommendation of booster dose is still under debate.

REFERENCES

1. Yen YH, Chen CH, Wang JH, Lee CM, Changchien CS, Lu SN. (2005) Liver Int. 25: 1162-1168.
2. Alvardo-Ramy F, Beltrami EM. (2003) Cleve Clin J Med. 70: 457-465.
3. Banatvala J, van Damme P, Oehen S. (2000) Vaccine. 19: 877-885.
4. Chathuranga LS, Noordeen F, Abeykoon AMSB. (2013) Int. J. Infect. Dis. 17: 1078–1079.
5. Eltayib HAA. (2014) Int. J. Med. Hlth. Sci. Res. 1: 29-36.
6. Zeeshan M, Jabeen K, Ali NA, Ali AW, Farooqui SZ, Mehraj V, Zafa A. (2007) BMC Infect. Dis. 2007: 120-124.
7. Havlichek JD, Rosenman K, Simms M, Guss P. (1997) Am. J. Infect. Contr. 25: 418-420.
8. Sheikh NH, Seema H, Majrooh A, Tariq M, Maqbool DH. (2007) Biomed. 23: 10-13
9. Pellissier G, Yazdanpanah Y, Adehossi E, Tosini W, Madougou B. (2012) PLoS ONE. 7: 44442-44446.
10. CDC. (2013) MMWR. 62: 1–19.
11. Mc Mohan BJ, Burden DL, Peterson KM. (2005) Ann. Intern. Med. 142: 333-341.
12. Poland GA. (1998) Am. J. Prev. Med. 15: 73-77.
13. CDC. (2001) MMWR. 50: 1-42.
14. Kermode M, Jolley D, Langkham B, Thomas M, Crofts N. (2005) Am. J. Infect. Contr. 33: 34–41.
15. Varma M, Mehta G. (2000) J. Ind. Med. Assoc. 98: 436–438.
16. Samir AS, Amitav B. (2008) Ind. J. Comm. Med. 33: 26–30.

