

## HBV Serological Profiles and Vaccination Status among Healthcare Workers in Istanbul, Turkey

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### Abstract

**Introduction:** The aim of this study is to determine the hepatitis B serological profiles, vaccination status, and prevalence of needlestick injuries (NSI) among HCWs in a tertiary hospital in Istanbul, Turkey.

**Methodology:** This study was conducted from February to March 2013 in Haseki Hospital. The study undertook randomly 333 volunteer HCWs working in different departments of the hospital with more than 6 months of job experience. A structured questionnaire was used to collect individual demographic parameters, history of occupational exposures and HBV vaccination coverage status. Blood samples of participating HCWs were collected for HBV profiling.

**Results:** Among the volunteer 333 subjects, 101 (69.7%) were male. Their age ranged between 19 and 62 years (mean 35.9 years) and the duration of their employment between 1 and 41 years (mean 16.9 years). Ninety-eight (29.4%) of the interviewed health-care workers reported that they had experienced at least one needlestick injury during their working life. Occupation and duration of employment were significantly associated with needlestick injury ( $P < 0.05$ ). Of 268 HCWs had serological tests, only two (0.7%) were found to be HBsAg positive. Total of 60 individuals who tested for anti-HBc, 25 (41.7%) were found to be positive. There was no significant association between anti-HBc seropositivity and age, gender, occupation or duration of employment.

In this study, 253 (76%) HCWs had completed their vaccination regimen. The highest rate of vaccination among doctors, followed by nurses and clinical staff. There was a significant association between occupation and vaccination status ( $P = 0.002$ ).

**Conclusion:** The frequency of HBV infection in HCWs was lower and vaccination rates were higher in our study. However, they are at increased risk for acquiring HBV infection due to occupational exposure to potentially infectious body fluids. Hence, suitable education, vaccination and post vaccination assessment must be implemented.

**Keywords:** HBV; Serology; HCWs; Vaccination

### Introduction

Hepatitis B virus (HBV) infection is one of the major public health problems in the world. Globally there are more than 350 million chronic HBV carriers and of whom one million die annually from HBV-related liver diseases [1]. The prevalence of HBV carriers varies from 0.1 percent to 2 percent in low prevalence areas (United States and Canada, Western Europe, Australia and New Zealand), to 3 to 5 percent in intermediate prevalence areas (Mediterranean countries, Japan, Central Asia, Middle East, and Latin and South America), to 10 to 20 percent in high prevalence areas (South-East Asia, China, sub-Saharan Africa) [1,2]. According to the World Health Organization (WHO) classification, Turkey is among the intermediate endemic countries. This HBsAg prevalence appears to considerably in various parts of the country.

Health care workers (HCWs) including clinicians, nurses, laboratory technicians and cleaning staff one of the largest risk groups for hepatitis B virus (HBV) infection worldwide [3-7]. In an unvaccinated person, the risk of HBV infection from single needle

stick injury to HBV infected blood ranges from 6%-30% and depends on the HBeAg status of the source individual.

HBV vaccine, which decreases the serious complications of HBV infections has been widely used since 1982 [8,9]. It has been reported that for the prevention of the HBV infection, high risk groups such as healthcare workers should be vaccinated [10,11], but its use among HCW in the developing world is low [12-15]. In Turkey, there have been vaccination policies for health care workers since 1999 and the prevalence of HBV infection among HCW has decreased from 3.34 to 2.29 within 10 years period before and after vaccination [16]. The aim of this study is to determine the hepatitis B serological profiles, vaccination status, and prevalence of needlestick injuries (NSI) among HCWs in a tertiary hospital in Istanbul, Turkey.

### Methodology

#### Setting and study population

This study was conducted from February to March 2013 in Haseki Hospital, one of the largest national training and research hospital in

Istanbul, with a bed capacity of about 536 beds. At the time of the study, the hospital had about 243 specialists, 361 officers, 442 nurses (nurses, midwives, and nursing assistants) and 450 cleaning staff. The study undertook randomly 333 volunteer HCWs working in different departments of the hospital with more than 6 months of job experience.

**Instrument**

A structured questionnaire was used to collect individual demographic parameters (gender, age, family HBV history, duration of employment, occupation and working department), history of occupational exposures, and HBV vaccination coverage status.

**Laboratory technique**

Blood samples of participating HCWs were collected for HBV profiling. Enzyme-linked immunosorbent assay (ELISA) kits (General Biological Corporations, Taiwan) to determine hepatitis B surface antigen (HBsAg), antibody to hepatitis surface antigen (anti-HBs) and antibody to hepatitis B core antigen (anti-HBc) (Abbott Laboratory, North Chicago, IL). Anti-HBs levels >10 mIU/mL were defined as protective levels. The HBsAg positive test results were repeatedly confirmed.

**Statistical analysis**

Analysis was carried out using SPSS 16 statistical software. Categorical variables were shown in percentages. Chi square test or Fishers exact Test were used to evaluate the association between seropositivity for HBV and categorical variables. A p value less than 0.05 was set as significant level.

**Results**

Among the volunteer 333 subjects, 101 (69.7%) were male. Their age ranged between 19 and 62 years (mean 35.9 years) and the duration of their employment in a clinical environment between 1 and 41 years (mean 16.9 years). Socio-demographical features of HCWs is shown Table 1

Ninety-eight (29.4%) of the interviewed health-care workers reported that they had experienced at least one needlestick injury during their working life. Of all occupational groups, nurses had the highest risk of being injured by needlesticks, 40.8% (n=53/130) of them reported a needlestick injury, followed by physicans with 33% (n=33/100). The prevalence of needlestick injuries was high (47.3%) among HCWs with work experience of >20 year (n=26/55). Occupation and duration of employment were significantly associated with needlestick injury (P<0.05).

Of 268 HCWs had serological tests, only two (0.7%) were found to be HBsAg positive. One of two person with chronic HBV infection was 29-year old female physician, had been working for 5 years and had family history of HBV. The other, 38-year old female nurse had been working for 20 years.

Total of 60 individuals who tested for anti-HBc, 25 (41.7%) were found to be positive. Two of them had chronic HBV infection, 23 had resolved infection. Characteristics and distribution (%) of anti-HBc positive and anti-HBc negative were summarized in Table 2. There was no significant association between anti-HBc seropositivity and age

(P=0.156), gender (P=0.856), occupation (P=0.420) or duration of employment (P=0.484).

Socio-demographical features	n	%
<b>Age</b>		
<30	89	26.7
30-50	215	64.5
>50	29	8.7
<b>Gender</b>		
Male	101	30.3
Female	232	69.7
<b>Occupation</b>		
Doctor	100	30
Nurse	130	39
Cleaning staff	37	11.2
Medical officer	42	12.6
Other	24	7.2
<b>Duration of employment</b>		
<= 1 year	18	5.4
1-5 year	104	31.2
6-10 year	82	24.6
11-20 year	74	22.2
>20 year	55	16.5
<b>HBV History of family</b>		
yes	19	5.1
no	314	93.7

**Table 1:** Socio-demographical features of HCWs.

Variables	Anti-HBc(+), (%)	n	Anti-HBc(-), (%)	n	Total	p
Age (mean ± SD)	39.3 ± 9.67		35.7 ± 8.73			0.16
<b>Gender</b>						0.85
Female	12 (29.3)		29 (70.7)		41	
Male	13 (68.4)		6 (31.6)		19	
<b>Occupation</b>						0.42
Doctor	5 (27.8)		13 (72.2)		18	
Nurse	6 (23.1)		20 (76.9)		26	
Clinical staff	2 (33.3)		4 (66.7)		6	
Medical officer	4 (44.4)		5 (55.6)		9	

Other	1 (100)	0 (0)	1	
<b>Duration of Employment</b>				0.48
<=1 year	0 (0)	5 (100)	5	
1-5 year	4 (25)	12 (75)	16	
5-10 year	4 (44.4)	5 (56.6)	9	
10-20 year	4 (30.8)	9 (69.2)	13	
>20 year	6 (35.3)	11 (64.7)	18	

In this study, 253 (76%) HCWs had completed their vaccination regimen. Vaccination status by work type were shown in Table 3. The highest rate of vaccination among doctors, followed by nurses and clinical staff. There was a significant association between occupation and vaccination status ( $P=0.002$ ). Among vaccinated HCWs, 185 (73.1%) had protective levels of anti-HBs. There was no association between immune responses and age ( $P=0.113$ ) or gender ( $P=0.399$ ). Of vaccinated HCWs, 41 (22%) had titers ranging from 10-100 IU/L, 74 (40%) had 100-499 IU/L and 70 (37.8%) had titers more than 500 IU/L.

Occupation	Unvaccinated, n (%)	Vaccinated, n (%)	Total, n
Doctors	13 (13)	87 (87)	100
Nurses	23 (17.7)	107 (82.3)	130
Clinical staff	11 (29.7)	26 (70.3)	37
Medical officer	23 (54.8)	19 (45.2)	42
Other	10 (41.7)	14 (58.3)	24
Total	80 (24)	253 (76)	333

**Table 3:** Vaccination status by work type.

## Discussion

The HCWs are at serious risk of acquiring bloodborne pathogen infections through exposure to blood or infectious body fluids [17]. Transmission of at least 20 different pathogens by needlestick injuries has been reported [18,19]. In this study, it was found that 29 per cent of HCWs had experienced NSI at some point in their careers and among the HCWs, nurses were most prone to NSI. Several other studies had also shown high occurrence of NSI among nurses [19-23].

HBV is the most commonly transmitted blood-borne virus in the healthcare setting [19]. Transmission generally occurs from patient to patient or from patient to health care personnel via contaminated instruments or an accidental needlestick. The incidence of HBV infection among health care workers has been lower than that of the general population since the mid-90s [24-26]. This is in contrast to the high prevalence of HBV serological markers in surveillance studies performed in the 1970s and 1980s [27].

It is known that Turkey is located in moderately HBV endemic (3-5%) area. Prior to the HBV vaccination, started as obligatory only for the new-borns, since 1995. Several studies reported HBV prevalence in HCWs ranging from 3.8% to 9.7% [28,29]. In this study, the prevalence rate is lesser than that observed in the western side of

the country. It might be related to the maintenance of HBV vaccination programmes in HCWs in our hospital since 1993. In 1987, all hospitals were advised to implement universal precautions and encourage HBV vaccination to provide a safe workplace [30]. The development of diagnostic methods and surveillance studies helped to decrease HBV seroprevalence among the HCWs in our hospital.

Hepatitis B Vaccination coverage data obtained through the National health interview survey (NHIS) in 2011 demonstrated  $\geq 3$ -dose coverage of 63.8% among HCP aged  $\geq 19$  years. The risk factors of the vaccination coverage would vary among different regions of country and among different occupational positions [31,32]. The data of these risk factors of vaccination coverage may provide important information for evaluation. By determining these factors and providing necessary facilities, vaccination coverage rates may be increased.

In conclusion, the frequency of HBV infection in HCWs was lower and vaccination rates were higher in our study, however, they are at increased risk for acquiring HBV infection due to occupational exposure to potentially infectious body fluids, hence, suitable education, vaccination and post vaccination assessment must be implemented.

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