



# Risk Factors of Viral Hepatitis B among Egyptian Blood Donors

H. I. Awadalla<sup>1</sup>, M. H. Ragab<sup>1</sup>, M. A. Osman<sup>2</sup> and N. A. Nassar<sup>3</sup>

<sup>1</sup>Medical Science Department, Institute of Environmental Studies and Research, Ain Shams University; <sup>2</sup>Faculty of Medicine, Ain Shams University; <sup>3</sup>Faculty of Medicine, Cairo University, Abbassia, Cairo, Egypt 11566

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## ABSTRACT

**Background:** Surveillance of infectious disease markers in the blood donor population is important in recognizing trends in prevalence and incidence of transfusion related infections in asymptomatic volunteer blood donors.

**Subjects & Methods:** It is a community base cross sectional study. Subjects of study are volunteers to donate blood. Samples were collected from blood donors and questionnaire was designed to collect the risk factors data. The prevalence of hepatitis B surface antigen (HBsAg) among 1,000 apparently healthy blood donors was determined.

**Objective:** To estimate the prevalence of virus B hepatic infection and to illustrate the various socio-economic, demographic and medical factors related to infection with HBV among apparently healthy individuals.

**Results:** The prevalence rate of HBV was 5%.

**Conclusion:** This study provides comprehensive and reliable information on the possible risk factors affecting spread of Hepatitis B.

*Keywords:* HBV, risk factors, blood donors;

## 1. INTRODUCTION

Despite that Hepatitis B is one of the most frequent infections associated with blood transfusion; it was the HIV epidemic that alerted the general public to the importance of serological tests in blood banks (Glynn, 2002). Hepatitis B is a serious global public health problem. Worldwide two billion people have been infected with the hepatitis B virus (HBV) and more than 350 million have chronic, lifelong infections (WHO, 2004). Based on the prevalence of HBV chronic carriers (individuals positive for hepatitis B

surface antigen) amongst adults in the general population, countries are classified as having low endemicity <2%, intermediate endemicity 2 - 8% or high endemicity >8% of infection (WHO, 2004). Even with three effective vaccines available, hepatitis B remains a stubborn, unrelenting health problem, especially in Africa and other developing areas. The disease and its complications cause an estimated one million deaths globally each year (Seo et al., 2008). Studies in the Middle East showed that the prevalence of HbsAg ranged from 3% to 11% in Egypt. These groups of chronic carriers include apparently healthy adults, school children, infants, pregnant women, blood donors and healthcare staff (WHO, 2004). The most common factors found to be associated with hepatitis infection and carrier status are the risk of prenatal transmission. Apart from the proven importance of the prenatal transmission, various studies found that maternal history of schistosomal infection was significantly associated with the prenatal transmission (Klenerman et al., 2002). Therefore, the objective of this paper is to estimate the prevalence of virus B hepatic infection and to illustrate the various socio-economic, demographic and medical factors related to infection with HBV among apparently healthy individuals.

It will be of interest to disclose the effect of the socioeconomic, behavioral and medical risk factors on the development of HBV infection among Egyptian blood donors. A better understanding of what contributes to the development of HBV infection will help in planning and implementing a national campaign for control of the infection all over the country.

## 2. MATERIALS AND METHODS

This was a cross sectional study. The total number of blood donors tested was 1000 Subjects who are volunteers to donate blood in Kaser Al Ani hospital blood bank, Cairo Egypt. To be eligible to donate blood, a person must be in good health and must be between 18-60 years of age. Generally, donors must weigh at least 50 kg. All donors must pass general and medical examinations prior to donation. Exclusion criteria include: younger or older ages, past history of jaundice, HIV, hypotension, anemia and sever chronic diseases. Questionnaire was designed; it included personal data, family history, past history, and questions about the possible different ways of exposure to the virus (medical and behavior).

Blood collected by venepuncture, serum or plasma may be used. ELISA HBsAg ULTRA assay is a one step enzyme immunoassay used routinely in blood banks and based on the principle of the sandwich type using monoclonal antibodies and polyclonal antibodies selected for their ability to bind with HBsAg. The presence of HBsAg allows the enzyme to bind to the solid phase. The enzyme action produces a colour which is measured with a photometer.

Statistical analysis: all donors' data were tabulated and processed using the SPSS (v.12) software packages, comparison between risk factors was done using student t- test. P value was considered significant if < 0.05.

## 3. RESULTS

Table 1 shows the relation between age and HBV test results, the mean age of positive subjects was higher than negative subjects. Their ages ranged from 18-59 years old with a mean of 38.5. The age distribution of the studied group is shown in Table 1. The mean age in HBV sero-negative group is 31.6 yrs. The mean age in the HBV sero-positive group is 34.3 yrs.

**Table 1: Mean age difference between Positive and negative cases of HBV test results**

HBV test result	No. (%)	Mean of age ± Std. Deviation	t value	P value
Negative	950 (95%)	31.58 ± 7.95	2.34	0.016
Positive	50 (5%)	34.34 ± 7.88		

Table 2 shows the relation between HBV test results and socio-demographic characteristics of the studied subjects. This table shows that most (90%) of the HBV positive cases were male. Most of HBV positive cases were workers (44%) and farmers (28%), while only 8% had jobs related to blood exposure. As regard Level of education, all cases were below university education. More than three quarters of (78%) of HBV positive cases were had low socio-economic standard.

**Table 2: Socio-demographic characteristics of positive and negative cases of HBV test results**

Socio-demographic risk factors		HBV test result				$\chi^2$	P value
		Negative		Positive			
		No. of negative cases	%	No. of positive cases	%		
Gender	Male	780	82.1	45	90.0	2.05	0.152
	Female	170	17.9	5	10.0		
Occupation	Workers	142	14.9	22	44.0	51.6	0.000
	Farmers	119	12.5	14	28.0		
	Managerial	199	20.9	5	10.0		
	Professionals	49	5.2	0	0.0		
	House wife	99	10.4	3	6.0		
	Students	293	30.8	2	4.0		
Level of education	Jobs related to blood exposure	49	5.2	4	8.0	10.5	0.014
	Illiterate	34	3.6	4	8.0		
	Read write	189	19.9	13	26.0		
Marital status	Secondary	591	62.2	33	66.0	20.2	0.000
	University	136	14.3	0	0.0		
Socio-economic level	Married	466	49.1	41	82.0	5.7	0.057
	Not	484	50.9	9	18.0		
	High level	98	10.3	0	0.0		
	Mid level	192	20.2	11	22.0		
	Low level	660	69.5	39	78.0		

Table 3 shows medically related Risk factors of HBV transmission. It was found that 28% of positive cases had injection by used needles and 54% of positive cases were accidentally subjected to a used needle, while one fifth of them had received parental antischistosomal treatment. It was found that dental treatment is a predominant risk factor for transmission of HBV as 96% of positive cases had received dental treatment. There was no statistically significant difference with respect to surgical treatment, site of circumcision and history of blood transfusion.

Table 4 shows the behavior related risk factors for HBV transmission. It was found that more than half (52%) of +ve cases are drug users. There were no statistically significant differences with respect to method of nail trimming, method of ear piercing and shaving. There was no statistical significant difference with respect to contact with patient having jaundice. It was found that 78% of positive cases had tattoo and 50% had sexual relations.

#### 4. DISCUSSION

The spread of hepatitis B virus continues to be at an alarming rate worldwide and this created an impact on many contraries. This study gives a highlight on HBV activity in Egypt. It demonstrated that the prevalence rate of HBV among 1,000 apparently healthy volunteers' blood donors was 5%. It was more frequent in young adults and in males than females. The results of this survey comply with the results of preceding studies by Schreiber et al. (1996) which reported that Egypt has an intermediate prevalence (2-8%) of HBV infection. A similar study reported that the prevalence of HBsAg among Kuwaiti national and non-Kuwaiti Arab was 1.1 and 3.5%, respectively (Ameen et al., 2005).

**Table 3: Medically related risk factors of HBV transmission**

Medically related risk factors		HBV test result				$\chi^2$	P value
		Negative		Positive			
		No. of negative cases	%	No. of positive cases	%		
Surgical treatment	Yes	214	22.5	11	22.0	0.008	0.931
	No	736	77.5	39	78.0		
<b>Site of circumcision</b>							
	Private tools at home	24	2.5	0	0.0	1.4	0.634
	Traditional healer	354	37.3	18	36.0		
	Public hospital	528	55.6	30	60.0		
	Not	44	4.6	2	4.0	0.019	0.890
History of blood transfusion	Yes	71	7.5	4	8.0		
	No	879	92.5	46	92.0	1.92	0.165
Injection by needle used before	Yes	189	19.9	14	28.0		
	No	761	80.1	36	72.0	30.8	0.000
Accidental wound with used needle	Yes	195	20.5	27	54.0		
	No	755	79.5	23	46.0	4.09	0.040
Parental antischistosomal treatment	Yes	102	10.7	10	20.0		
	No	848	89.3	40	80.0	12.7	0.000
Dental treatment	Yes	698	73.5	48	96.0		
	No	252	26.5	2	4.0	0.02	0.868
Hospitalization	Yes	180	18.9	9	18.0		
	No	770	81.1	41	82.0		

A significant correlation was found between HBV test results and socio-demographic characteristics of the studied subjects. It was revealed that most (78%) of the HBV positive cases were belong to a low socio-economic standard. This was in agreement with the earlier study by Board (1999) that in Egypt HBV hepatitis antigen was more prevalent among lower than upper socioeconomic classes (6.9% and 0.7% in lower and upper socioeconomic classes respectively). The prevalence of HBV was lowest in countries with the highest standards of living such as Great Britain, Canada, United States, Scandinavia, and some other European Nations (Glynn and Kleinman, 2002).

The current study revealed that 8% of HBV positive cases had jobs related to blood exposure. This was in accordance with Memon (2002) that frequent and routine exposure to blood or serum is the common denominator of healthcare occupational exposure to HBV. Surgeons, dentists, oral surgeons, pathologists, operating room and emergency room staff, and clinical laboratory workers who handle blood are at the highest risk. Rarely, transmission to patients from HBsAg positive health care workers had been documented (Alam et al., 2007).

The results of this study demonstrated that 28% of HBV positive cases had injection by used needles and 54% of positive cases were accidentally subjected to a used needle. In another study, contaminated and inadequately sterilized syringes and needles had resulted in outbreaks of hepatitis B among patients in clinics and physicians' offices (Tripathi et al, 2007). The reuse of the same, unsterilized needle and syringe for vaccination of many different children accounts for many unnecessary HBV infections (Pan and Zhang, 1996).

**Table 4: Behavior related risk factors for HBV transmission**

Behavior related risk factors		HBV test result				$\chi^2$	P value
		Negative		Positive			
		No. of negative cases	%	No. of positive cases	%		
Sexual relations	Yes	60	6.3	25	50.0	116.5	0.000
	No	890	93.7	25	50.0		
Contact with jaundiced patient	Yes	110	11.6	2	4.0	2.7	0.098
	No	840	88.4	48	96.0		
Tattoo	Yes	274	28.8	39	78.0	53.3	0.000
	No	676	71.2	11	22.0		
Drug abuse	Yes	33	3.5	26	52.0	201.4	0.000
	No	917	96.5	24	48.0		
Nail trimming	Private tools	880	92.6	46	92.0	0.02	0.868
	Common tools	70	7.4	4	8.0		
	Private tools	30	3.2	0	0.0		
Ear piercing	Common tools	141	14.8	5	10.0	2.7	0.438
	No	779	82.0	45	90.0		
Shaving	Private tools	146	15.4	5	10.0	4.8	0.505
	Common tools	799	84.1	45	90.0		
	No	5	5.0	0	0.0		

It was found that dental treatment is a predominant risk factor for viral hepatitis transmission where 96% of HBV positive cases had received dental treatment. This was in agreement with Alam et al. (2007) that people sharing unsterile medical or dental equipment are at high risk of contracting HBV.

There was no statistically significant difference between HBV test results with respect to surgical treatment, site of circumcision and history of blood transfusion. HBV is stable on environmental surfaces for at least 7 days, and indirect inoculation of HBV can occur via inanimate objects like toothbrushes, baby bottles, and toys, razors, eating utensils, hospital equipment and other objects, by contact with mucous membranes or open skin breaks (Pan and Zhang, 1996). In this study there were no statistically significant differences with respect to method of nail trimming, method of ear piercing, shaving and contact with patient having jaundice.

However half of HBV positive cases had sexual relations, these results might be explained by the fact that this study was conducted in a single institution, so results may be influenced by characteristics of the donor population and specific practices of the screening assays used. Busch (2004) and Lee et al. (2008) confirmed that sexual and prenatal HBV transmission usually results from mucous membrane exposures to infectious blood and body fluids. Saravanan et al. (2007) reported that HBsAg had been found in all body secretions and excretions. However, only blood, vaginal and menstrual fluids, and semen has been shown to be infectious.

There were no statistically significant differences with respect to contact with patient had jaundice and HBV test results. Kuhns (2004) reported that HBV infection may also be transmitted between household contacts and between sexual partners, either homosexual or heterosexual, and in toddler-aged children in groups with high HBsAg carrier rates.

The findings of this study indicated that more than half (52%) of HBV positive cases were drug users. Consistent with these findings, those of Lee et al. (2008) that the major risk factor for both HBV infections is parenteral exposure, especially among injecting drug users and hemophiliacs. Intermediate prevalence of 20 to 30% had been observed in patients receiving haemodialysis (Alberti et al., 2003).

Results of the current study indicated that 78% of HBV positive cases respectively had a tattoo. This finding provides support for the postulate of Tripathi et al. (2007) that occasionally, outbreaks of hepatitis B have been traced to tattoo parlors and acupuncturists.

## **5. CONCLUSION**

It will remain interesting to carry out in future community-based epidemiological studies in other areas all over Egypt to determine the prevalence of HBV infection among Egyptians blood donors.

Prevention is the only safeguard against spread of viral hepatitis infection, through avoiding the practices that increase the risk of exposure to infection. Hepatitis B vaccine must be given to high risk groups as health care workers especially those having jobs involving exposure to blood and individuals living in low socio-economic standard.

Careful screening of blood, blood products, adequate sterilization of reusable surgical and dental instruments, professional and public health education and implementation of infection control practices in all health facilities should be followed to control spread of Hepatitis B.

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