Epidemiology of Hepatitis B Virus Among Blood Donors and Families of Infected Donors in Saladdin Governorate

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Abstract

It is a common and potentially serious infection of the liver that results in significant morbidity and mortality caused by hepatitis B virus. Hepatitis B is spread predominantly by the parenteral route or by intimate personal contact. During the incubation period, HBsAg, HBeAg, and HBV DNA become detectable in serum and rise to high titers. The highest rates of HBsAg carrier are found in developing countries with primitive or limited medical facilities. Identifying the Epidemiology of Hepatitis B virus infection among blood donors and families of infected donors. A cross- sectional study was conducted on (2408) blood donors and (324) persons of the members of family of some positive cases through the period extended from the first of May 2006 up to the end of December 2006, in Main Blood Bank Centre in Tikrit Teaching Hospital and in Public Health Laboratory of Saladdin Health Office. The information was obtained from the positive cases and their families by the researcher according to prepared questionnaire. All blood samples are screened for the presence of HBsAg by enzyme-linked immuno-sorbent assay (ELISA) technique, using Biokit, S.A. Barcelona-Spain (bioelisa HBsAg colour). The prevalence of positive cases among blood donors was (3.49%) while the prevalence among infected cases family members was (10.19%). The cases were increase proportionally with increasing in age. The Hepatitis B carrier cases were higher among male(3.4%), rural (4.55%), married (3.9%), illiterates (4.56%) and those with history of surgery(4.2%) but the differences for all previous were of no significant while among those with a history of blood transfusion(4.23%), the result was statistically significant . regarding the positive cases among family members of positive blood donors, The carriers were higher among siblings (6.22%). The prevalence of positive cases among blood donors were increase proportionally with increasing in age and among those with a history of blood transfusion ,the result was statistically significant in addition to that the prevalence among infected cases family members was more frequent among siblings.

Key word: epidemiology, HBV, Blood donors

Introduction

It is a common and potentially serious infection of the liver that results in significant morbidity and mortality caused by hepatitis B virus. The virus causes liver inflammation and necrosis without significant involvement of other organs. [1]. Hepatitis B is spread predominantly by the parenteral route or by intimate personal contact [2]. Maternal to child transmission is the predominant mode of transmission in high prevalence areas [3]. In comparison horizontal transmission particularly in early childhood accounts for most cases of chronic HBV infection in intermediate prevalence areas, while unprotected sexual intercourse and intravenous drug use in adults are the major routes of spread in low prevalence areas [4]. HBV occurs worldwide. The highest rates of HBsAg carrier are found in developing countries with primitive or limited medical facilities [5].

The prevalence of HBV carriers is less than 2 % in low prevalence areas (United States and Canada, Western Europe, Australia and New Zealand), 3 to 8 % in intermediate prevalence areas (Mediterranean countries, Japan, Central Asia, Middle East, and Latin and South America), and more than 8 % in high prevalence areas (southeast Asia, China, sub-Saharan Africa) [6, 4]. The prevalence of HBV among blood donors may not be representative of the general population. In some settings, blood donors tend to be healthier than individuals in the general population and consequently are more willing and capable of donating blood. While in countries where donors are paid for their blood, these individuals may have higher

rates of infection than the general population [60].

There are many studies on blood donors: - in Iraq the frequency of HBV among blood donors was (3.6%), Amman-Jordan (4.4%),Saudi Arabia- Reyadh (4.6%),republic of Yemen (18.5%) [7]. Many studies showed that HBV infection is increased with age [8, 9]. The carrier prevalence rates among men are more than women, that is due to occupational and other risk factors leading to the more exposure of males [10]. According to a report by WHO, in the years 1980 to 1985, 6- 8% of all HBV-infected individuals were hospital personnel. [11].

The other important factor in the determination of the prevalence rate of carriers is the area of habitation. Considering the socioeconomic state and sanitary conditions of the villages, and the absence or presence of certain risk factors in the cities, such as drug addiction. The growth of urban population has not been regarded as a serious risk factor in the rise of the prevalence rate of carriers. Studies from Egypt, Jordan, Yemen, Iran, and Nigeria reported that the prevalence of carriers is higher in rural areas[7,12,13,14,15].

With respect to marriage and its effects on the prevalence rate of carriers, the rate of marriage and heterosexual relations are considered a significant risk factor [16, 17]. During the incubation period, HBsAg, HBeAg, and HBV DNA become detectable in serum and rise to high titers. Liver enzyme elevation usually occurs prior to the onset of jaundice. Acute HBV is rarely symptomatic in infant and young children [18, 2]. In acute hepatitis B, treatment is supportive [19]. In chronic hepatitis B, therapy is administered to suppress viral replication and prevent progression of liver disease[20]. However the most effective way to prevent transmission of HBV is by immunization [21].

Patients and Methods

The current work represents a cross- sectional study, which had been conducted through the period extended from the first of May 2006 up to the end of December 2006, in Main Blood Bank Centre in Tikrit Teaching Hospital and in Public Health Laboratory of Saladdin Health Office. Depending on risk factors and modes of transmission of HBV; the investigator designed a questionnaire regarding some personal characteristics of blood donors.

Family members of blood donors who are HBsAg positive came to Public Health Laboratory of Saladdin Health Office, the main viral hepatitis referral centre in the area and checked for the presence of HBsAg in their blood. In the Public Health Laboratory of Saladdin Health Office; all blood samples are screened for the presence of HBsAg by enzyme-linked immuno-sorbent assay (ELISA) technique, using Biokit, S.A. Barcelona-Spain (bioelisa HBsAg colour).

From those first time donors (2408 persons) only 84 were HBsAg+ve, and just 57 of them had been came to Public Health Laboratory of Saladdin Health Office with 324 members of their families; within the period of study. The questionnaires were filled by the investigator during blood donation.

Results

The total sample of this study was 2408 first time blood donors and 324 individuals who were the families of HBV infected donors. From the 2408 donors, only 84 (3.49%) were HBsAg+ve,. Of those 324 family members, 33 (10.19%) were HBsAg+ve. Table (1) revealed that the age group 21-30 years (55%) was the largest group of blood donors while the smallest group was that of age group 50 years old and above (1.29%).There is proportional increase of cases according to increase in age.

Table (2) shows that most of blood donors (97.47%) were male subjects and there was no significant difference between male and female in distribution of cases. Table (3) revealed that the positive cases were more frequent among those who are rural. Table(4)shows that the infected blood donors 65 (3.9%) were more frequent than among non married donors were (2.57%) but there is no significant difference.

Table (5) shows that the percentage of carriers among farmers (4.81%) was the highest frequency and the lowest among medical staff (1.72%) . Table

(6) revealed that the highest frequency of cases (4.56%) was among illiterates (not read or write).Table (7) shows that 381(15.82%) of blood donors were had been done surgical operations. Table (8) shows that the cases were more frequent among those with history of blood transfusion(4.23%). Table (9) revealed that the screening of family members shows that the cases were more frequent among siblings (59.57%).

Discussion

The HBs Ag carrier rate among the normal population was estimated to be 4.3%; the majority represents a state of childhood infection with persistence into adulthood rather than new exposure to the virus [22, 23-25].

The study has been revealed that the rate of HBV infection in blood donors was 3.49% which is considered nearly similar to rates reported on blood donors by Al-Kassab S. in Iraq: (3.6%) and Syria: (3.8%). It is lower than rates reported in Jordan (4.4%), Saudi Arabia-Riyadh (4.6%), Pakistan (4.7%), Yemen (9.8%), and in Palestine (5%-7%) [7, 26, 27-30]. It is higher than other studies on blood donors reported in Turkey(1.5%) [31], Iran (1.9%)[8, 32 - 34], India 1.2-1.7% [35] and in Lebanon: (1.9%) [36]. The study agreed with the fact that Iraq is located within region of intermediate endemicity [7]. The rate of HBV was lower among young donors than older donors and it was found to be directly proportional with age. These results are agreed by Farhat A., Al-Nassiri KA., and Zali MR. [9,12,13]. The age group 21-30 years included (55%) of the donors was the largest group, This these results agree with that reported by other researchers in Pakistan (56.3%), and in Saudi Arabia; found that the age group 20-29 years, which included (50.8%) of the donors was the largest group[28, 37, 38].

Regarding gender, the rate of HBV was nearly similar in males and females. This agreed by El-Hazmi MM., Farhat A. and Al-Faleh FZ. [37, 9, 39]. Regarding residency; the rate of HBV carriers from urban areas was lower than that from rural. This result agreed with that reported in Egypt, Jordan, Yemen, Iran, and Nigeria [7, 12, 13, and 40], while others from Nepal and Tanzania revealed the opposite[41, 42]. This may be explained on the basis of the relatively poorer socioeconomic state and sanitary conditions of the villages in Iraq, and rural individuals are more exposed to trauma.

The higher rate of HBV among married blood donors was agreed by studies done in Iran, and in Lebanon [14, 36] while disagreed by a study in Yemen [12]. This may be due to a consequence of age. Regarding occupation, the rate of carriers among different occupational groups was varied .It was agreed by that reported in Iran and in Egypt who showed that the highest prevalence of HBsAg being amongst farmers (3.2%), [14, 8, 10].

Regarding the inverse relationship between level of education and the rate of infection; it was in agreement with results found by Zali MR. in Iran who found this inverse relationship [14]. Regarding higher rate of infection in relation to history of blood transfusion; it was agreed by studies in Jordan, Egypt and the Republic of Yemen [7]. (15%) were HBsAg+ve, while the rate among those didn't receive blood was 8.1%.

Regarding families of infected blood donors; the higher rate of HBV among family members is similar to a study in Bosnia [43] by Nermin NS et al. Regarding intra familial transmission of HBV; they found that the prevalence of hepatitis B surface antigen was higher among family members (12.2%) than among blood donors (3.6%).

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Table (1): Distribution of the Blood Donors according to Age Groups.

Age group	Blood Donors					
	HBsAg-ve		HBsAg+ve		Total	
	No.	%	No.	%	No.	%
≤ 20	99	98.02	2	1.98	101	4.19
21- 30	1284	96.98	40	3.02	1324	55
31- 40	794	95.89	34	4.11	828	34.39
41- 50	118	95.16	6	4.84	124	5.15
> 50	29	93.55	2	6.45	31	1.29
Total	2324		84		2408	100

Chi square = 3.96, d.f. = 4, P> 0.05. (NS)

Table (2): Distribution of Blood Donors according to Gender.

Gender	Blood Donors					
	HBsAg-ve		HBsAg+ve		Total	
	No.	%	No.	%	No.	%
Male	2265	96.51	82	3.494	2347	97.47
Female	59	96.72	2	3.33	61	2.53
Total	2324		84		2408	100

Chi square = 0.01, P-value > 0.05. (NS)

Table (3): Distribution of Blood Donors according to Residence.

Residence	Blood Donors					
	HBsAg-ve		HBsAg+ve		Total	
	No.	%	No.	%	No.	%
Urban	1526	97.07	46	2.93	1572	65.28
Rural	798	95.45	38	4.55	836	34.72
Total	2324		84		2408	100

Chi square = 4.25, P = 0.0392. (NS)

Table (4): Distribution of Blood Donors according to Marital Status.

Marital status	Blood Donors					
	HBsAg-ve		HBsAg+ve		Total	
	No.	%	No.	%	No.	%
Ever married	1603	96.1	65	3.9	1668	69.27
Not married	721	97.43	19	2.57	740	30.73
Total	2324		84		2408	100

Chi square = 2.69, P-value > 0.05. (NS)

Table (5): Distribution of Blood Donors according to Occupation.

Occupation	Blood donors					
	HBsAg-ve		HBsAg+ve		Total	
	N0.	%	No.	%	No.	%
Functionary	396	97.3	11	2.7	407	16.9
Manual worker	318	95.78	14	4.22	332	13.79
Army &policeman	390	96.77	13	3.23	403	16.74
Medical staff	57	98.28	1	1.72	58	2.41
Student	219	97.77	5	2.23	224	9.3
Farmer	435	95.19	22	4.81	457	18.98
House wife	46	95.83	2	4.17	48	1.99
Free job	410	96.7	14	3.3	424	17.61
Without job	53	96.34	2	3.64	55	2.28
Total	2324		84		2408	100

Table (6): Distribution of Blood Donors according to the Level of Education.

Level of education	Blood Donors					
	HBsAg-ve		HBsAg+ve		Total	
	No.	%	No.	%	No.	%
Not read or write	241	10.37	11	4.56	252	10.46
1-6 years	716	30.81	29	4.05	745	30.94
7-12 years	878	37.78	30	3.42	908	37.71
≥12 years	489	21.05	14	2.86	503	20.89
Total	2324		84		2408	100

Chi square = 1.77, P-value > 0.05. (NS)

Table (7): Relation between HBV Infected Blood Donors and History of Surgery.

History of Surgery	Blood Donors					
	HBsAg-ve		HBsAg+ve		Total	
	No.	%	No.	%	No.	%
Yes	365	95.8	16	4.2	381	15.82
No	1959	96.65	68	3.35	2027	84.18
Total	2324		84		2408	100

Chi square = 0.68, P-value > 0.05. (NS)

Table (8): Relation between HBV Infected Blood Donors and History of Blood Transfusion.

Receive blood	Blood Donors					
	HBsAg-ve		HBsAg+ve		Total	
	No.	%	No.	%	No.	%
Yes	68	95.77	3	4.23	71	2.95
No	2256	96.53	81	3.47	2337	97.05
Total	2324		84		2408	100

Fischer Exact test = 0.12, P-value = 0.73.

Table (9): Distribution of HBsAg+ve among Families of Infected Blood Donors.

Type of relation	Family members					
	HBsAg-ve		HBsAg+ve		Total	
	No.	%	No.	%	No.	%
Siblings	181	93.78	12	6.22	193	59.57
Wives	41	91.1	4	8.89	45	13.89
Brothers & Sisters	28	75.68	9	24.32	37	11.42
Parents	15	71.43	6	28.57	21	6.48
Other family members	26	92.86	2	7.14	28	8.64
Total	291		33		324	100

Chi square = 19.53, d.f. = 4, P= 0.00061, (highly significant)