
Seroepidemiological Study of Hepatitis B virus infection among Blood Donors and Risky Groups in Diyala

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Abstract:

Subject: To explore the prevalence of hepatitis B virus infection among blood donors and risky groups in Diyala province and their relevance to epidemiologic factors.

Materials & methods: In this study, the records of HBsAg screening and confirmatory tests of virology unite/public health laboratory/ Baquba were reviewed for the period 1989 to 2000. Different generations of enzyme-linked immunosorbant assays (ELISA) were used throughout this period. Demographic information including, age, sex, residence, occupation and time of diagnosis were also collected. All data were statistically analyzed.

Results: The grand prevalence of HBV infection in blood donors was 1.5%. The prevalence rates in risky groups were as follows; hemophiliacs (42.8%), Acute icteric cases (13.6%), thalassemics (10.2%), household contacts (10.1%), hemodialysis patients (7.5%), prisoners (3.1%), health care workers (2.7%), barbers (1.9%) and midwives (0.5%). There was male to female predominance of 2.6:1, and the age group (16-29 years) was mostly affected (46.2%). The highest prevalence was found in 1991 (4.7%). Regarding the geographical distribution, Al-Mukdadia sector showed the highest prevalence (24.6/10⁵ population), while the overall prevalence in Diyala was 17.9/10⁵ population). The majority of HBsAg positive cases were diagnosed among blood donors.

Conclusion: Diyala province rank in the intermediate zone of HBV endemicity. Seroepidemiologic surveillance provides a comprehensive picture of the HBV infection and the relevant factors that are important in evaluating the effectiveness of control measures.

Key word: Seroepidemiological, Hepatitis B, Blood Donors, Risky Groups, Diyala

Introduction:

Viral hepatitis caused by several unrelated viruses, is a significant problem of human health globally ^[1]. Of the known hepatitis viruses, hepatitis B virus (HBV) has received more interest due to its wide distribution and high prevalence and also to the severe long-term consequences of chronic infection by this virus ^[2, 3]. HBV is transmitted sexually, vertically and parenterally, and the latter being responsible for the post-transfusion hepatitis B infection ^[4]. A part from multiple blood recipients, other people who are at high risk of HBV infection include health care workers (HCWs), patients with chronic diseases and those with abnormal sexual behaviors ^[5-7]. However, several studies have documented that the screening of blood for hepatitis B surface antigen (HBsAg) and the introduction of hepatitis B vaccine in the expanded program of immunization (EPI) have greatly reduce the rate of HBV infection ^[8,9]. In Iraq, the prevalence of HBV infection range between 1.7% and 6.5% as reported from different provinces ^[10-12]. This retrospective study aimed to explore the seroepidemiological pattern of HBV infection among blood donors and other risk groups in Diyala province.

Materials & methods:

The records of the virology unit in the public health laboratory in Baquba (the center of Diyala province) were reviewed for the period from 1989 to 2000. The results of HBsAg screening and confirmatory tests for blood donors and risky

groups (hemophiliacs, acute icteric patients, thalassemics, household contacts, hemodialysis patients, prisoners, HCWs, barbers and midwives) were recorded. Additionally, other information concerning subject's age, sex, residence, occupation and the time of diagnosis were collected. All data were submitted for statistical analyses.

Throughout the study period, different generations of ELISA were followed. The assay procedure of each kit was proceeds following manufacturer's instructions. Repeatedly HBsAg positive sera were retested for confirmation at the reference laboratory for viral hepatitis in the center of communicable disease control in Baghdad.

Results:

Screening of blood donors and risky groups for detection f HBsAg by ELISA technique was expanded to include all Iraqi provinces since 1989. Revision of records of HBsAg screening and confirmatory tests in Diyala province for the period 1989-2000, revealed that 74,900 subjects were tested and 1934 were HBsAg positive. Table (1), showed the frequency distribution of HBsAg positive cases according to the year of registration. The highest was in 1991 (4.7%) and the grand prevalence throughout the study period was (2.5%). However, there were slight differences in the monthly distribution of HBsAg positive cases.

The prevalence rates of HBsAg among blood donors and other risky groups throughout the study period were shown in table (2).

Table (1): Distribution of HBsAg positive cases by year throughout the study period.

Years	No. tested	No. positive	%
1989	20685	89	3.3
1990	6441	201	3.1
1991	3051	145	4.7
1992	2128	54	2.5
1993	4942	191	3.8
1994	6261	171	2.7
1995	5004	139	2.7
1996	8269	191	2.3
1997	9212	209	2.2
1998	10833	252	2.3
1999	11645	199	1.7
2000	4429	93	2.0
Total	74900	1934	2.5

Table (2): Distribution of HBsAg positive by study groups.

Study groups	No. tested	No. positive	%
Blood donors	61049	954	1.6
Household contacts	3678	372	10.1
Acute icteric cases	3046	415	13.6
Hemodialysis patients	292	22	7.5
Prisoners	1167	37	3.1
Thalassemics	137	14	10.2
Hemophiliacs	14	6	42.8
Health care workers	2238	62	2.1
Midwives	723	4	0.5
Barbers	2489	48	1.1
Gypsies	67	0	0
Total	64900	1934	2.5

The mean age of patients was 28.8 years, with slightly elevated in males as compared to females (29.6 Vs. 26.6 years). Furthermore, it was found that the age group 16-39 years was the hardly affected; harboring 75.9% of the positive cases, table (3). In this respect it is necessary to mention

that 285 of the subjects were missing age in the records.

Regarding the gender of patients, a higher HBsAg positivity rate was found among males as compared to females (72.2% Vs. 27.8%). The male: female ratio for different study groups was shown in table (4).

Table (3): Distribution of HBsAg positive cases by age.

Age (Years)	HBsAg positive	
	No.	%
< 5	27	1.6
5-9	59	3.5
10-15	60	3.6
16-29	760	46.2
30-39	489	29.7
40-49	175	10.6
50-59	47	2.8
60-69	23	1.3
> 70	9	0.5
Total	1649 *	100

Table (4): Male: female ratio of HBsAg positive cases for different study groups.

Study groups	HBsAg positive			M:F ratio
	No.	Male	Female	
Health care workers	62	48	14	3.4
Prisoners	37	36	1	36.0
Hemodialysis	22	10	12	0.8
Household contacts	372	177	201	0.8
thalassemia	14	11	3	3.7
Acute icteric cases	415	207	208	1.0
Blood donors	954	862	92	9.4
Barbers	48	44	4	11.0
Total	1924 *	1395	535	2.6

*4 female midwives and 6 hemophiliac males were not included.

In order to determine the distribution of HBsAg positivity rate according to the residence, the governorate was divided into seven sectors namely; Baquba center, Baquba peripheries, Al-Mukdadia, Al-Khalis, Khanaqin, Jalawla and Baladruz. Table 5 showed the cumulative (12 years) prevalence as well as the yearly prevalence rate for each sector. The highest prevalence was in Al-Mukdadia sector

(24.6/10⁵ population). Again we have to mention here that 215 patients were missing residence in the records.

The results also showed that the bulk of HBsAg positive cases were among blood donors (49.3%) followed by acute icteric group (21.4%), while other groups harboring the remaining (28.6%) of the cases.

Table (5): The prevalence rate of HBsAg case according to residence.

Residence	HBsAg positive cases	Total population	12 years period prevalence/10 ⁵	Average yearly prevalence/10 ⁵
Al-Mukdadia	216	79884	270.4	24.6
Baquba periphery	372	168000	221.4	20.1
Baquba center	542	325200	166.7	15.2
Al-Khalis	300	238959	125.5	14.4
Khanaqin	63	52410	120.2	10.9
Baladruz	130	159293	81.6	7.4
Jalawla	96	158000	60.8	5.5
Total	1719*	1181746	162.9	17.9

215 patients were missing residence in the records.

Discussion:

Because the majority of children and adults infected with HBV do not develop clinical disease, seroepidemiologic studies provide a more comprehensive picture of the distribution of this infection than does acute disease surveillance^[1, 13]. Trends in HBV infection are important in evaluating the effectiveness of recommended routine vaccination of infants and adults at high risk of infection^[14]. Since no such previous studies in Diyala, thus we conducted this 12 years retrospective study to explore the prevalence of HBV infection among blood donors and risky population, and its correlation with certain demographic factors.

Regarding the distribution of HBsAg positive cases by year, a highest infection rate was registered in 1991(4.7%). This may be related to the partially impairment of fundamental health programs following US aggression against Iraqi peoples in 1990^[15]. Whereas, the lowest prevalence in 1992 may be attributed to the severe shortage in the diagnostic materials, however, there were slight differences in the monthly distribution of HBsAg positive cases throughout the study period.

The prevalence of HBV infection in different regions may differ widely depending on the rate of chronic infection, proportion of people with HBsAg positive and the predominant route of transmission. In the Middle East, for instance, the horizontal transmission in early childhood is the predominant route by which HBV endemicity rate are

maintained^[3, 16]. Infection at this age period accounts for about 30% of chronic carriers^[17]. Moreover, exposure to BV is steadily increased with age.^[18,19] These cumulative numbers of chronic HBV carriers were only detected serologically when they tested for HBsAg for any reason like blood donation during their adult life. This may explain the highest HBV infection rate in the 16-39 years age group in this study, since the bulk of HBsAg positive cases (49.3%) were found among blood donors.

The results also showed that males were more affected than females (72.2% Vs. 27.8%), and the overall F: M ratio in all study groups was 2.6. These results were consistent with others.^[10, 20]

Additionally, the high M: F ratio among blood donors (4.9) was not unusual in our community, since the majority of blood donors were males and this is again concordant with other results^[11, 21].

As the geographic distribution of HBsAg positive cases, the highest yearly as well as cumulative prevalence were found in Al-Mukdadia and Baquba peripheries (24.6/10⁵ & 20.1/10⁵) respectively. This may be related to the lifestyle of people and the occupational hazards in this periurban area. Beside that, the usage of improperly sterilized multiple use syringes by private HCWs was not uncommon. However, the prevalence rates in other sectors showed mild variation, and this may be attributed to the lifestyle of the population in different sectors. The rate of missing age and

residence were low (14.7% & 11%) respectively, and there is no reason to believe that is related by any means to a specific age or residence, so a bias (if present) does not affect the distribution by age or residence to any important extent.

The prevalence rate of HBV infection among blood donors throughout the study period was 1.5%. Similar results were obtained by other studies.^[12, 23] Several studies have reported that screening of blood donors for HBsAg has greatly reduced the prevalence of infection.^[4, 8, 24] Accordingly, it can be speculated that screening of blood donors in Diyala, which was started in 1989, may play a role to achieve this low prevalence.

The high prevalence of HBV infection among hemophiliacs, thalassemics and hemodialysis patients obtained in this study (42.8%, 10.2% & 7.5%) respectively, was not unusual since these groups of multiple blood recipients had been recognized as a high risk groups for HBV infection^[25,26].

Transmission of HBV in health care settings and prisons had been well documented. In the present study, slightly higher prevalence was found among HCWs and prisoners (2.7% & 3.1%) respectively. In this respect, our results are consistent with those obtained by others^[7, 27, 28, 29].

Another feature that characterized HBV infection in this study is the high HBsAg positive rate among the household contacts of index cases (10.1%). The tendency for family clustering of HBV carriers had been recognized.^[19,30] Beside the traditional routes of transmission, the non-parental, non-sexual transmission of HBV among household members is maintained by intimate person-person contact, through sharing of shaving-razors, toothbrushes and bath-brushes^[20,31].

The absence of seasonal pattern to the spread of HBV strongly suggests the unapparent percutaneous exposure. However, it remains the fact that in 10%-40% of HBV cases the means of virus spread are unidentified^[21, 32].

A part from acute icteric cases, there remains the midwives and barbers in whom the prevalence of HBV infection (0.5% & 1.9%) are within the range of the prevalence in the general population. The statistical analyses revealed that the majority of HBsAg positive cases were not unusual, since blood donors constitute the bulk (81.5%) of the tested subjects in this study.

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