HBV markers and antibody protective level among Iraqi vaccinated and unvaccinated subjects

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Summary:

Background: *Iraq is among countries of intermediate hepatitis B endemicity. Although several studies have been carried out on the prevalence of HBV markers, no previous study was done to determine the protective antibody level after HBV vaccination. Therefore, this study was carried out to detect HBV markers and antibody protective level among vaccinated and unvaccinated Iraqi subjects.*

Materials: *A total of 400 subjects (298 thalassaemic patients and 102 "healthy" subjects) were included in the study for the period 1st Oct. 2002 to 28th Feb. 2003. Thalassaemic patients represent the vaccinated group, and the "healthy" subjects represent the unvaccinated control group.*

Results: *The same rate of HBsAg was detected in vaccinated and unvaccinated groups (2%). Protective anti-HBs level was demonstrated in 229 (76.8%) and 25 (24.5%) of vaccinated and unvaccinated groups, respectively. The protective rate of protective level of anti-HBs among those who receive three primary doses of vaccine (77.7%) was significantly higher than among those who did not complete the course of vaccination.*

Conclusion: *The rate of protective anti-HBs level among those who received the full course of vaccination is lower than that reported in literature. Improper vaccination or handling of the vaccine could also contribute to this low level as result of deterioration of health services during the last 2 decades.*

Key word: *HBV, anti-HBs, protective anti-HBs, vaccination, Iraq*

Introduction:

Viral hepatitis caused by HBV constitutes a major economic and public health problem through the world particularly in developing countries [1,2]. Infection in vaccine recipients was limited to those who failed to acquire antibody after vaccination and to whom exposure to hepatitis B virus occurred before vaccine induced protective antibody appeared . Effective hepatitis B vaccine has been available since 1982, which was most effective in eliminating HBV transmission and development of carrier state and its complication 4

Iraq with a prevalence rate of 4.3% among normal Iraqi population is among countries of intermediate hepatitis B endemicity [5]. Countries with intermediate or high endemicity must have mass immunization for all infants at birth [4]. In Iraq, although several studies have been carried out on the prevalence of HBV markers [5-14], no previous study was done to determine the protective antibody level after HBV vaccination. Therefore, this study was carried out to detect HBV markers and antibody protective level among vaccinated and unvaccinated Iraqi subjects.

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Materials and methods:

A total of 400 subjects was included in this study. They included 298 thalassaemic patients attending thalassaemic clinics in Al-Karama and Ibn Al-Balady teaching hospitals in Baghdad, and 102 "healthy" subjects selected from those attending the Central Public Health Laboratory for investigation, for the period 1st Oct. to 28th Feb. 2003. Thalassaemic patients represent the vaccinated group as routine vaccination of these patients was started in Iraq in 1986.Their age ranged between 6 and 44 years with a male to female ratio of 1.1:1. The apparently "healthy" subjects represent unvaccinated control group, their age ranged between 6 and 44 years with a male to female ratio of 0.9:1. Vaccinated "healthy" subjects were excluded from the study.

Each participant was interviewed individually. The data requested included age, sex, and vaccination status. HBsAg and anti-HBc (IgG) was detected by an enzyme immunoassay method (EIA). Anti-HBs was detected by enzyme linked fluorescent immunoassay (ELIFA). A titer greater than 10 m I.U per ml indicates that antibody level is protective 15,16

All tests were carried out at the Central Public Health Laboratory using commercially available kits.

Chi-square, yate's correction, fisher Exact Probability test and t- test were used to determine the differences in markers between the two groups.

P value less than 0.05 was considered statistically significant.

Results:

HBsAg was detected in 6 (2.0%) vaccinated subjects and 2 (2.0%) unvaccinated subjects; 87.9% of vaccinated subjects and 25.5% of unvaccinated subjects had anti-HBs. A significant statistical difference in the prevalence of anti-HBs was detected between the two groups ($p < 0.05$). No significant statistical difference was detected in the prevalence of anti-HBc between vaccinated (30.3%) and unvaccinated (27.0%) subjects ($p > 0.05$). Protective anti-HBs level was demonstrated in 229 (76.8%) and 25 (24.5%) of vaccinated and unvaccinated groups, respectively. A statistically significant difference was found between the two groups ($p > 0.05$). The level of anti-HBs (mean ± SD) in vaccinated group was 276.2±218mI.U/ml and 216.6+216mI.U/ml in unvaccinated subjects. A statistically significant difference was found between the two groups ($p < 0.05$). These findings are shown in Table 1.

Table I Distribution of HBV parameters among the studied groups

Variable	Vaccinated group			Unvaccinated			P value
	Total	Positive		Total	Positive		
	No.	No.	%	No.	No.		
HBsAg	298	6	2.0	102	2	2.0	> 0.05
Anti-HBs	298	262	87.9	102	26	25.5	< 0.05
Anti-HBc	298	91	30.3	102	27	27.0	> 0.05
Protective level of anti-HBs	298	229	76.8	102	25	24.5	< 0.05
Level of anti-HBs (Mean + SD)	262	276	+218	26	216.6	+216	< 0.05

Table 2 shows the distribution of the prevalence of protective antiHBs according to the doses received by the vaccinated subjects. It was detected in 223 (77.7%) of those who received the three primary doses. This prevalence rate is significantly higher than among those who did not complete the course of vaccination ($p < 0.05$).

Table 2 Distribution of protective anti-HBs according to doses of vaccine.

No. of doses	Total No.	No.	Protective anti-HBs level
1	4	2	50
2	7	4	
3	287	223	
Total	298	229	

Discussion:

This study revealed an equal prevalence of HBsAg and a nonsignificant difference in the prevalence of anti-HBs between thalassaemic patients and healthy controls. This indicates that thalassaemic patients should be no more at high risk of acquiring HBV infection than healthy controls. This may be related to the low level of HBsAg prevalence reported recently in the country as a whole [10-14,16-19]. This is further corroborated by reports from Western countries, where nearly all people are vaccinated that there was no difference in the prevalence rates of HBV between risk groups and normal population [20]. Similarly reports from African countries, where prevalence of HBV is high, revealed that all people have the same risk of acquiring infection and no difference in the prevalence rate among polytranfused risk groups and normal population was found [21]. The recently reported low HBsAg prevalence in our country could be attributed to the introduction of routine HBV vaccination for risk group and infants together with rigorous screening of blood donors in addition to the use of disposable syringes and transfusion sets with other hygienic measures 17-19,22,23

Detection of anti-HBs among unvaccinated subjects could be attributed to remote past infection followed by clearance of the HBsAg. This is further supported by the demonstration of slightly higher prevalence of anti-HBc (27.0%) and anti-HBs (25.5%) among this group. Other workers have shown that examination of sera for anti- HBc may identify 2 - 4% more cases of previous HBV infection than do detection of anti-HBs 24.2s

The higher prevalence of anti-HBc among vaccinated subjects is obviously due to development of anti-HBs as a result of vaccination and past HBV infection; they elicit a protective antibody response in more than 75% of vaccinated subjects. However, 24.5% of non- vaccinated subjects had protective anti-HBs due to past infection or minor repeated exposure to virus 25.

Vaccinated subjects had a significantly higher mean of anti- HBs level than unvaccinated subjects, this finding indicates that vaccination elicit a higher antibody exposure than post infection. The rate of anti-HBs decline is closely related to height of antibody response and time elapsed after vaccination [25,26]. However, no data on the time elapsed after vaccination is available in this study. Low and undetectable level of circulating anti-HBs may not necessarily be indicative of loss of protection. Immunogenic memory cells may play a part in the protection against HBV infection, as it is suggested by lack of clinically significant HBV infection in the population [27].

This study showed, also, that 77.7% of vaccinated subjects, who received the full course of vaccination, had a protective level of anti-HBs.

This is lower than that reported by other workers who reported a protective level varying between 90% and 98%21-12 . This low protective level percent in comparison with the finding of other workers could be attributed to variations in the time elapsed after vaccination between various studies. Improper vaccination or handling of the vaccine could also contribute to this low protective level as a result of deterioration of health services during last 2 decades 33_36.

References:

1. *Toukan, A. Strategy for the control of hepatitis B in Middle East and North Africa. Vaccine 1990; 8: S 117-S 121.*

2. Toukan, A. Hepatitis B in the Middle East: Aspects of Epidemiology and liver disease after infection. Gut 1996; 38(suppl.). S2-S4.

3. Gibas A, Watkins E, Hinkle C, Dienstag JL. Long term persistence of protective antibody after hepatitis B vaccination of healthy adults. J Med Virology 1987; 21: 90.

4. Chin J. Control of communicable diseases manual, 17th edition. Washington DC, American Public Health Association. 2000, pp. 138-141.

5. Omer AR, Thewaini AJ. Hepatitis B surface antigen in Iraqi population. Trans Roy Soc Trop Med Hyg 1976; 70: 527- 528.

6. Al-Balaghi, SM, Kassir Z, Thewaini AJ. Hepatitis B surface antigen in various liver diseases in Iraq. J Trop Med Hyg 1977; 80: 248-251.

7. Al-Shamma R M, Omer A R. Hepatitis B virus in haemodialysis unit in Iraq. Iraqi Med J 1990; 38-39: 39-43.

8. Al-Mashhadani J I, Al-Hadithi T, Al-Diwan Jk, Omer A. Prevalence of hepatitis B serological markers among health care workers in Baghdad, Iraq. J A B M S 2006 (submitted for publication).

9. Al-Azzawi A and Kadouri M. The status of blood donors in Iraq. Second National Symposium on viral hepatitis. Baghdad 1984, 2729 Oct.

10.Toffik KA, Al-Diwan JK, Al-Hadithi T, Al-Waiz M, Omer A. Prevalence of the serological markers of hepatitis B, C, and D among patients with sexually transmitted diseases (STDs) in Baghdad, Iraq. J A B M S 2006; 8: 1-5E.

11 .Al-Hilli IIA, Ghadhban JM. Prevalence of serological markers of hepatitis B virus (HBsAg) and hepatitis C virus (HCV antibody) among blood donors and certain risk groups. J Fac Med Bagh 1999, 42:45-52.

12.Mahmood AK, Addose SA, Salih HA, Al-Khadi A. Seroprevalence of HBsAg and anti-HCV positive blood donors in Najaf governorate. Iraqi J Comm Med 2001; 14:29-33.

13.Kadhim MT, Al-Rubyae MG, Suhail HJ. The prevalence of HBsAg carrier state among healthy population in Al-Diwanyah, Iraq. Iraqi J Comm Med 2002; 15: 22 - 26.

14.Kadir M, Ismail A, Tahir S. Seropositivity of hepatitis B and C among different groups of population in Al-Tameem province. Iraqi J Comm Med 2001; 14: 21 - 23.

15.Belloni C, Pistorio A, Tinelli C et al. Immunization with hepatitis B vaccine: a five year study. Vaccine 2000; 18: 1307-1311.

16.McMahon BJ, Bruden DL, Peterson KM et al. Antibody level and protection after hepatitis B vaccination: results of a 15 years follow up. Ann Intern Med 2005; 142: 33-34.

17.Majeed M N.(2002). Prevalence of hepatitis B and hepatitis C infections among thalassaemic children in Najaf city. Kufa Med J 2002; 5:192-196.

18.Amal H. The frequency of blood born viruses (HBV, HCV, and HIV) among children with thalassaemia and sickle cell anaemia. The first scientific conference on thalassaernia and hemoglobinopathies in Iraq. MOH, Technical Affair Directorate, Baghdad 2002, pp. 16. (abstract).

19.Al-Jabri AJ. Prevalence of HBV and HCV among thalassaemic patients in Thiqar city. The first scientific conference on thalassaemia and hemoglobinopathies in Iraq. MOH, Technical Affair Directorate, Baghdad 2002, pp. 22 (abstract).

20.Courice A, Laplanche A, Benhaman E, Jungers P. Long term efficacy of hepatitis B vaccine in healthy adults. In: Zuckerman AJ (editor). Viral hepatitis and liver disease. New York, Alan R. Liss. Inc. 1988, pp. 1002- 1005.

21.Ayoola EA. The viral hepatitis in Africa. In: Zukerman. AJ (editor). Viral hepatitis and liver disease, New york, Alan R. Liss. Inc. 1988, pp. 161-169.

22. Al-Churmockly H, Mahdi KM. The prevalence of hepatitis B and C serological markers among patients with hereditary coagulation disorders. J Fac Med Bagh 2002; 44: 4-8.

23.Jaleel N. HBsAg and anti-HCV in four haemodialysis centers in Baghdad. Iraqi J Comm Med 2003; 16: 205- 207.

24.Dienhardt F, Gust ID. Viral hepatitis. Bull Wld Hlth Org 1982; 60: 661-690.

25.Jilag N, Achmidt M, Deinhardt F, Zachonal R. hepatitis B vaccination: how long does long protection last? Lancet 1984; 11: 458.

26.Hadler SC, Francis DP, Maynardt JE et al. Long term immunogenicity and efficacy of hepatitis B vaccine in homosexual men. New Eng J Med 1986; 315: 209- 214.

27.Taylor PE, Stevens CE. Persistence of antibody B surface antigen after vaccination with hepatitis B vaccine. In: Zuckerman AJ (editor). Viral hepatitis and liver disease. New York, Alan R. Liss. Inc. 1988, pp. 995 - 997.

28. Gerely RJ. Recombinant hepatitis vaccine. In: Zuckerman AJ (editor). Viral hepatitis and liver disease, New York, Alan R. Liss Inc. 1988, pp. 1017 - 1024.

29. Coaste AR, Mable LH, James G et al. Immunogenicity and safety of a yeast derived recombinant DNA hepatitis B vaccine. In: Zuckerman AJ (editor). Viral hepatitis and liver disease. New York, Alan R. Liss. Inc. 1988. pp. 1038- 1042.

30.West DJ, Brown KR. Persistence of anti-HBs in recipient hepatitis and liver disease. In: Zuckerman AJ (editor). Viral hepatitis and liver disease. New York, Alan R. Liss Inc. 1988, pp. 1043 - 1046.

31.Yaho M, Tashiro A. Clinical evaluation of recombinant yeast derived hepatitis B vaccine. In: Zuckerman AJ (editor). Viral hepatitis and liver disease. New York, Alan R. Liss Inc. 1988, pp. 1050- 1052.

32.Pririsen CG, Prinsen AS, Andre FA, Pilot P. Immunization of homosexual men with recombinant DNA vaccine against hepatitis B: Immunogencity and protection. In: Zuckerman AJ (editor). Viral hepatitis and liver disease. New York, Alan R. Liss Inc. 1988, pp 1056 - 1058.

33.Al-Alwan A. Health in Iraq. A draft prepared as discussion paper for First National Conference on Health. Ministry of Health. August 2004.

34.Al- Nouri I, Al-Rahim Q. The effect of sanctions on children of Iraq. Arch Dis Children 2003; 88: 92.

35.Niazi A, Al-Kubaisi W. The humanitarian and health impact of war and embargo on Iraq. Iraqi Med J 1998; 47: 1-4.

36.UNICEF - Iraq. The situation of children in Iraq. An assessment based on United Nations convection on right of child. Geneva 2002.

37.Abdul Latif B, Al-Diwan JK, Al-Hadithi T, Al-Hadi A. Low birth weight and prematurity in the neonatal unit of a maternity and pediatrics hospital in Iraq. J Trop Pediatr 2006; 52: 148-152.