Chulalongkorn Medical Journal

Volume 34
Issue 10 *October 1990*

Article 3

10-1-1990

Antibody response to different hepatitis vaccinesThai infants after booster dose

Prasobsri Ungthavom

Sungkom Jongpipatvanich

Reutai Sakulramrung

Boosba VivataVakin

Sothom Hongnipon

นิพนธ์ต้นฉบับ

Antibody response to different hepatitis vaccines in Thai infants after booster dose.*

Prasobsri Ungthavorn**
Sungkom Jongpipatvanich** Boosba Vivatavakin**
Reutai Sakulramrung** Sothorn Hongnipon**

Ungthavorn P, Jongpipatvanich S, Vivatavakin B, Sakulramrung R, Hongnipon S. Antibody response to different hepatitis vaccines in Thai infants after booster dose. Chula Med J 1990 Oct; 34(10) : 749-753

Hepatitis B infection is one of the growing health problems in Thailand. Hepatitis B vaccine has been used throughout the country during the last five years. However, there are many types of vaccines available and it would be useful if the physicians are able to use any vaccines available in their community to complete or booster the course. The study was designed to measure antibody response to three different hepatitis vaccines after the booster dose.

Seventy-nine infants aged 9 months who received three doses of hepatitis B vaccine (CLB, 3 ug) at birth, 1 and 2 months of age were randomly selected into 3 groups. The first group (22), the second group (35) and the third group (22) were given CLB 3 ug, Hepaccine-B 3 ug., HB-Vax II 5 ug. respectively. Anti-HBs level was measured by Abbott's radioimmuno-assay (RIA) method by one experienced technician at the age of 9 and 12 months.

Seroconversion rates of group I,II,III before the booster injections were 81.8%, 68.6% and 63.6% and geometric mean titres were 82.6, 89.1 and 88.3 mIU/ml respectively. After booster doses of the three different vaccines, seroconversion rate of groups I,II,III were 86.4%, 91.4% and 77.3% and geometric mean titres were 239.1, 274.6 and 211.8 mIU/ml respectively. There were no statistical differences between these three groups on both seroconversion rates and geometric mean titres. However, seroconversion rates of group II who were given Hepacine-B vaccine showed statistical difference at the age of 12 months.

In conclusion, the two different plasma derived and one DNA recombinant vaccines gave similar antibody responses after the booster dose injection.

Reprint request : Ungthavorn P, Department of Pediatrics, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand.
Received for publication. July 10, 1990.

* Supported by China Medical Board.
** Department of Pediatrics, Faculty of Medicine, Chulalongkorn University.
*** Department of Microbiology, Faculty of Medicine, Chulalongkorn University.

ประสบศรี อึ้งถาวร, สังคม จงพิพัฒน์วณิชย์, บุษบา วิวัฒน์เวคิน, ฉุทัย สกุลแรมรุ่ง, โสทร หงนิพนธ์. การตอบสนองทางอิมมูนหลังการฉีดกระตุ้นของวัคซีนป้องกันตับอักเสบ บี ต่างชนิดในเด็กไทย. จุฬาลงกรณ์เวชสาร 2533 ตุลาคม; 34(10): 749-753

วัคซีนป้องกันตับอักเสบ บี มีจำหน่ายในประเทศหลายชนิด ซึ่งในแต่ละท้องถิ่นจะมีวัคซีนใช้ไม่เหมือนกัน ดังนั้น ถ้าบุคลากรทางการแพทย์สามารถจะใช้วัคซีนชนิดต่าง ๆ ที่มีในท้องถิ่นของตนมาให้ต่อเนื่องกับวัคซีนที่เด็กเคยได้มาก่อน จะเป็นประโยชน์ต่อแนวทางการให้วัคซีนตับอักเสบแก่เด็กทารกทั้งประเทศต่อไป

การศึกษาได้กระทำในเด็กทารกอายุ 9 เดือน เกิดที่โรงพยาบาลจุฬาลงกรณ์ สภากาชาดไทยจำนวน 79 คน ที่ได้รับวัคซีนป้องกันตับอักเสบ บี ชนิด plasma derived (CLB 3 มคก.) 3 เข็ม เมื่ออายุแรกเกิด, 1 และ 2 เดือน โดยแบ่งเด็กออกเป็น 3 กลุ่ม จำนวน 22, 35 และ 22 คน ตามลำดับ กลุ่มที่ 1 และ 2 ฉีดวัคซีนตับอักเสบชนิด plasma derived ได้แก่ CLB 3 มคก. และ Hepaccine-B 3 มคก. ตามลำดับ กลุ่มที่ 3 ฉีดวัคซีนชนิด yeast-derived (HB-Vax II 5 มคก.) ตรวจเลือดหาระดับภูมิคุ้มกัน Anti-HBs ที่อายุ 9 เดือน และ 12 เดือน ด้วยวิธี Abbott's Radio Immuno Assay (RIA)

ผลการศึกษาพบว่า seroconversion rate ของทารุกกลุ่มที่ 1,2,3 ที่อายุ 9 เดือน ก่อนการให้วัคซีนกระตุ้นเท่ากับร้อยละ 81.8, 68.6 และ 63.6 ตามลำดับ และ geometric mean titres เท่ากับ 82.6, 89.1 และ 88.3 mIU/ml ซึ่งไม่แตกต่างกันทางสถิติ (P = 0.98) เมื่ออายุ 12 เดือน อัตรา seroconversion และ geometric mean titres ของทารถทั้ง 3 กลุ่ม คือร้อยละ 86.4, 91.4, 77.3 และ 239.1, 274.6, 211.8 mIU/ml ตามลำดับ ซึ่งผลการศึกษาทั้งหมดไม่มีความแตกต่างกันทางสถิติ ยกเว้นในกลุ่มที่ 2 ที่ได้รับ Hepaccine-B เป็นวัคซีนกระตุ้นนั้นมีอัตรา seroconversion ที่อายุ 12 เดือน สูงกว่าเมื่ออายุ 9 เดือนมาก (P = 0.01)

ผลการศึกษาสรุปได้ว่า การให้วัคซีนต่างชนิดกันมาฉีดกระตุ้นที่อายุ 9 เดือน ให้ผลตอบสนองทั้งในด้าน seroconversion rate และระดับภูมิคุ้มกันที่เกิดขึ้นไม่แตกต่างกัน

Hepatitis B infection is one of the growing health problems in Thailand. Hepatitis B vaccine has been used throughout the country during the last five years. However, there are many types of vaccines avaibable and it would be useful if the physicians are able to use any vaccines available in their community to complete or booster the course. The study was designed to measure antibody response to three different hepatitis vaccines after the booster dose.

Material & Method

Seventy-nine infants aged 9 months who received three doses of plasma derived hepatitis B vaccine (CLB, 3 ug) at birth, 1 and 2 months of age were randomly selected into 3 groups. The first group (22), the second group (35) and the third group (22) were given CLB 3 ug, Hepaccine-B 3 ug. (plasma derived), HB-Vax II 5 ug. (yeast recombinant) respectively. Anti-HBs level was measured by Abbott's radioimmuno-assay (RIA) method by one experienced technician at age of 9 and 12 months.

Result

1. After 3 doses of CLB vaccine were given at birth, 1 and 2 months of age, seroconversion rate was 70.9% and GMT of Anti-HBs titres was 86.6 mIU/ml (table 1) The result of GMT among 3 groups was not statistically different (p = 0.98)

Table 1. Immunogenicity of CLB 3 ug at 9 month following first injection (age 9 mos).

Group	No. tested	Anti-HBs (mIU/ml) <10	Anti-HBs (mIU/ml) ≥10	GMT
Group I	22	18.2	81.8	82.6
Group II	35	31.4	68.6	89.1
Group III	22	36.4	64.6	88.3
Total	**79**	**29.1**	**70.9**	**86.6**

2. Anti-HBs titers at the age of 12 months, 3 months after booster injections of three different vaccines at 9 months of age, show that GMT of groupsI, II, III were 239.1, 274.6 and 211.8 mIU/ml respectively (table 2). The GMT of Anti-HBs titres of three different vaccines was not of statistical significance (p = 0.63)

Table 2. Immunogenicity of hepatitis vaccine at 12 mos following first injection (booster at 9 mos).

Vaccine groups	Gr.I CLB	Gr.II Hepaccine-B	Gr.III HB-Vax II
No. tested	22	35	22
Anti-HBs titer (mIU/ml)			
< 10	3(13.6%)	3(8.6%)	5(22.7%)
10-99	4(18.2%)	5(14.3%)	3(13.6%)
100-999	9(40.9%)	16(45.7%)	6(27.3%)
≥ 1,000	6(27.3%)	11(31.4%)	8(36.4%)
GMT	239.1	274.6	211.8

3. Seroconversion rate at the age of 9 and 12 months using Anti-HBs titre 10 mIU/ml or over showed good response in all groups particularly the hepaccine-B vaccine (table 3).

4. Using Fisher's exact test, there was no statistical difference in seroconversion rate among the three different vaccines at the age of 12 months, 3 months after the booster injection (table 4).

Table 3. Seroconversion rate at 9 and 12 months following first injection.

Group	No. tested	Mos. following first injection	
		9 mos.	12 mos.
Group I :			
CLB 3 ug	22	81.8%	86.4%
Group II :			
Hepaccine-B 3 ug	35	68.6%	94.4%
Group III :			
HB-Vax II 5 ug	22	63.6%	77.3%
Total	**79**	**70.9%**	**86.1%**

Table 4. Comparing seroconversion rate at 12 mos after the first injection.

Group	I & II	I & III	II & III
Seropositive			
No.	19 32	19 17	32 17
%	86.4 91.4	86.4 77.3	91.4 77.3
p valve	**0.43**	**0.35**	**0.13**

* statistical significance (p = 0.01)

Discussion

At the age of 9 months, infants who received a full course of CLB plasma derived vaccine had GMT of Anti-HBs titre 86.6 mIU/ml and 70.9% seroconversion rate which was comparebly lower than other studies done by Ip et al, Leslie et al. and Chung et al.[1]

Ip et al[2] studied Anti-HBs titre in infants aged 6 months who received 3 doses of had Hepatitis vaccine (CLB) at 0,1,2, months of age whose GMT was 151 mIU/ml.

Leslie et al[3] demonstrated that Anti-HBs level in adults after 3 doses of CLB was 194 mIU/ml 8 months later.

In addition, seroconversion rate from other studies showed that the rate of 88% at 6 months of age was present after 3 doses of hepaccine-B vaccine given to infants at birth, 1 and 2 month of age,[1] and 100% conversion rate after CLB at 0,1,2, and 6 months of age.[4]

The Anti-HBs titre and seroconversion rate depend on the time of antibody detection which was different in each study. However, factors that may

have affected our relatively low response included the use of CLB vaccine close to the expiry date on the lot used, the presence of hepatitis carrier mother and the laboratory method used for antibody detection. In our study, none of the mothers were screened for carrier status and the studies in Thailand have already shown that the carrier rate among pregnant women are about 8-10%.

The Anti-HBs titre were not different statistically between the 3 groups of infants 9 months of age ($p = 0.98$). The titres rose sharply after the booster dose in all three groups (239.1, 274.6, 211.8) with the highest response in group II (hepaccine-B vaccine). The GMT of three different vaccines was not different statistically ($p = 0.63$). Similarly, seroconversion rate was highest in hepaccine group (68.75% to 91.4%) sine all infants who were seronegative after 3 doses became positive after booster injection at 9 months of age.

Thus, the result of this present study demonstrated that the immunological responses of different hepatitis vaccine after the booster injections were similar eventhough the vaccine were of different origin and were by different methods.

The result of the study may help to remind physicians who care for children in developing countries where hepatitis is endemic and vaccination is required routinely at birth that the vaccine may be changed during the course of the vaccination particularly the booster dose and they can continue to vaccinate children with the hepatitis vaccine that is available in the community.

Conclusion

In summary, 79 infants who received three doses of hepatitis vaccine (CLB 3 ug) at birth, 1 and 2 months of age were randomly selected and given 3 different types of hepatitis vaccine at the age of 9 months. The antibody responses and seroconversion rate 3 months later showed similar result with no statistical significance for all types of vaccine except the group with hepaccine vaccine which showed better seroconversion.

References

1. Chung WK, Choi KY, Shim KS, Chang JW, Sun HS, Chung KW. Safety, immunogenicity and efficacy of a new heat-inactivated hepatitis B vaccine in newborn recipients. In : Zuckerman AJ, ed. Viral Hepatitis and Liver Disease. London : Alan R. Liss, 1988. 1014-6
2. Ip HMH, Wong VCW, Reesink HW. Immunogenicity study of a Plasma-Derived Heat-Inactivated Hepatitis B Vaccine in Newborn Babies : Asia-Oceania. J Obstet Gynaecol 1988 Sep; 14(3) : 367-71
3. Lelie PN, Reesink HW, de Jong-Van Manen ST, Dees PJ, Reerink-Brongers EE. Immunogenicity and safety of a plasma-derived heat-inactivated hepatitis B Vaccine (CLB). Studies in volunteers at a low risk of infection with hepatitis B virus. Am J Epidemiol 1984 Nov; 120(5) : 694-702
4. Wong VCW, Ip HMH, Reesink HW, NcoLelie P, Reerink-Brongers EE, Yeung CY, Ma HK. Prevention of the HBsAg carrier state in newborn infants of mothers who are chronic carrier of HBsAg and HBeAg by administration of hepatitis B vaccine and hepatitis B immunoglobulin. Lancet 1984 Apr 28; 1(8383) : 921-6