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Research and Innovation Division,
Universiti Teknologi MARA (UiTM) Selangor,
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ANTIBODY RESPONSE TO BOOSTER DOSES OF HEPATITIS B VACCINE IN MEDICAL STUDENTS VACCINATED IN INFANCY

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ABSTRACT

(This study investigates the antibody response to booster doses of the hepatitis B vaccine in medical students vaccinated during infancy. Hepatitis B vaccination has been part of Malaysia's National Immunisation Programme since 1989, with no routine post-vaccination antibody measurements. This study aimed to evaluate antibody levels and the response to booster doses in individuals who completed the primary vaccination series in infancy but no longer had protective antibody levels (anti-HBs <10 mIU/ml). A descriptive prospective study was conducted on medical students from Universiti Teknologi MARA. Participants with written proof of completing the three-dose primary series were included. Antibody levels were measured at baseline, seven days after the first booster dose, 28 days after the second dose, six months after the third dose, and one-month post-final booster. The recombinant hepatitis B vaccine Euvax B, containing 20 µg of hepatitis B surface antigen with an aluminium hydroxide adjuvant, was used. Anti-HBs levels were measured using an electrochemiluminescent immunoassay (COBAS E411 analyser). Of 152 participants, 19.08% had baseline protective antibody levels (≥10 mIU/ml). Fifty-six students with evidence of prior vaccination were eligible for the study, and 37 completed the full protocol. At seven days post-first dose, 8/37 (21.62%) achieved protective antibody levels, rising to 31/37 (83.78%) by 28 days and 37/37 (100%) by six months. The findings indicated a robust anamnestic response in most participants, with a single booster dose restoring protective antibody levels in 83.78%. The study highlights the waning of hepatitis B antibodies 19–20 years post-primary immunisation. Although protective levels persisted in 19% of young adults, most participants responded to a single booster dose, reaffirming the effectiveness of the vaccination program. The results support booster vaccination for healthcare workers to ensure adequate protection against hepatitis B.

Keywords: hepatitis b vaccine, booster, antibody response

INTRODUCTION

Hepatitis B vaccination has been included in the Malaysian infancy vaccination schedule since 1989. Post-vaccination antibody measurements are not recommended after routine vaccination in infancy, and non-responders were not identified. Healthcare workers are considered at high risk of being infected with hepatitis B through work-related injuries and are recommended to prevent infection through vaccination if they do not have protective levels of antibodies. Antibody levels measured years after primary immunisation will be low due to natural waning. We conducted this study to determine the antibody levels after one, two and three doses of hepatitis booster vaccine in individuals who have completed primary vaccination in infancy.

MATERIAL AND METHOD

We performed a descriptive prospective study to determine the effect of booster hepatitis B vaccines by measuring the hepatitis B surface antibody levels after booster vaccination on a group of medical students who had completed three doses of primary vaccination in infancy, but no longer had protective levels of antibody for hepatitis B surface antigen (anti-HBs <10 mIU/ml).

As proof of hepatitis B vaccination, we accepted childhood immunisation records that included an immunisation book or card provided by government or private institutions with the dates and doses of vaccines given as part of the Malaysian National Immunisation Programme. To qualify for the study, the participant needed to have written evidence of three doses of hepatitis vaccines given at 0-, 1- and 6-months intervals.

Antibody levels were measured at 0 (before the first dose), ~7 days after the first dose, ~28 days (before the second dose), ~ 6 months (before the third dose) and one month after the last dose of vaccine. Levels equal to and above 10mIU/ml were considered protective. Levels measured at seven days and one month after the first booster dose were considered an anamnestic response to primary immunisation in infancy.

The vaccine used for the booster vaccination programme was Euvax B, manufactured by LG Chem Ltd, and is a WHO prequalified vaccine. It is a recombinant hepatitis B vaccine with 20 micrograms of hepatitis B surface antigen combined with an aluminium hydroxide adjuvant.

Blood analysis for AntiHBs was done by electrochemiluminescent immunoassay using the COBAS E411 analyser.

RESULTS AND DISCUSSION

As part of a medical student hepatitis B vaccination drive, 152 second-year students from the Faculty of Medicine, Universiti Teknologi MARA, consented to participate in the study. They were screened for baseline hepatitis B surface antibodies before vaccination, and 29/152 (19.08 %) had anti-HBs \geq 10 mIU/ml.

Only 56 participants were able to provide written evidence of completion of the three-dose hepatitis B vaccination series. 11/56 already had an anti-HBs \geq 10 mIU/ml at baseline, and seven were excluded because they were unable to complete the study.

Table 1: Antibody response to booster vaccinations

Test (~)	Numbers that achieved anti-HBs \geq 10 mIU/ml (N=37)
7 days	8
28 days	31
6 months	37
7 months	37

Healthcare workers are at increased risk of being infected by blood-borne viruses, including Hepatitis B, in the line of their work. Unlike other blood-borne viruses like HIV and hepatitis C, an efficacious vaccine exists for hepatitis B that is 90-95% effective at preventing infection in adults.1 Malaysia, as part of its National Immunisation Programme, has included hepatitis B vaccination in the childhood schedule since 1989. As a result, the majority of children would have already received three doses of hepatitis B vaccination before entering school. 2

Considering the current age of our participants and the age at hepatitis b vaccination, it would have been 19-20 years (mean age 19 years) after primary immunisation. Antibody levels at this stage would have been expected to wane below protective, even detectable levels. The persistence of protective levels of antibodies was seen in 19% of our study participants. This may also reflect exposure to hepatitis b prior to testing.

Anamnestic response sufficient to provide protective levels of antibodies was seen in the majority of our participants (83.78 %) one month after the first booster vaccine, and the remaining participants only required a second dose to achieve protective levels. Because we had not measured antibody levels at two months, it was unclear whether this would have occurred anyway without a second booster vaccine dose.

CONCLUSION

The persistence of protective levels of antibodies for hepatitis B is only seen in a minority (19 %) of young adults 20 years after the primary hepatitis b vaccination series. However, anamnestic response after a single booster was able to reach protective levels of antibodies in the majority of participants (83.78 %). The second dose of vaccine at one month was sufficient to achieve protective levels of antibodies in the remainder.

REFERENCES

- Palmovi, I. D., Cmjakovic-Palmovic J. (2022). Vaccination against hepatitis B. Results of the analysis of 2000 population members in Croatia. *Eur J Epidemiol.* 1994;10:541–547.
- Malaysia Ministry of Health, The Malaysian National Immunisation Programme. (<http://www.myhealth.gov.my/en/immunisation-schedule/>) . Accessed 3rd of November 2022.