

Effectiveness of hepatitis B vaccination in STIKes Jenderal Achmad Yani Cimahi students

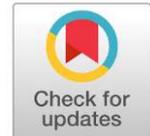
Gina Khairinisa^{1a*}, Fini Ainun Qolbi W^{1b}

¹ Stikes Jenderal Achmad Yani Cimahi, Jalan Terusan Jenderal Sudirman, Cimahi 40533, Indonesia

^a gina_khairinisa@yahoo.co.id *

^b fini.ainun@gmail.com

* corresponding author



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ABSTRACT

Hepatitis B is an inflammatory disease of the liver caused due to an infection from the hepatitis B virus (HBV). This inflammatory liver disease can become chronic, causing liver cirrhosis, and then become cancerous. Hepatitis B vaccination process by injection. Hepatitis B antibodies can appear in response to Hepatitis B vaccination. The purpose of this study as an effort to decide the effectiveness of Hepatitis B vaccination by seeing whether active immunity has formed against infections caused by the Hepatitis B virus to Stikes Student Jenderal Ahmad Yani Cimahi. The research method used in this research is descriptive. Samples used in the study were 30 people who met the inclusion criteria. From the results of studies using the immunochromatographic method, all positive samples were found with hepatitis B antibodies. Based on the research can be concluded that the vaccination conducted on Stikes Jenderal Achmad Yani Cimahi has given effective results and has a protective titer to prevent hepatitis B virus infection that will attack his body.

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INTRODUCTION

Hepatitis B is a disease caused by the hepatitis B virus that can cause inflammation of the liver. This chronic case of liver inflammation can develop into liver cancer and cirrhosis of the liver.¹ Results of the 2013 Basic Health Research (Riskesdas) the type of hepatitis that mostly attacks Indonesian people is hepatitis B with a percentage of 21.8%. Efforts to prevent hepatitis B infection are by vaccinating Hepatitis B.^{2,3}

Giving the hepatitis B vaccine by injection to healthy people will produce Anti-HBs antibodies as much as 95% in response to hepatitis B vaccination. Anti-HBs is an antibody obtained from the hepatitis b virus and is an active immunity for the body.⁴ The success of the vaccination is known from the Anti-Hbs titer examination. The number of antibody titers can decrease in proportion to immunization interval, at older ages with longer immunization distances, Anti-HBs titers will decrease. Giving vaccines to infants and children will produce a good response, even though the dose given is smaller than the adult dose. Anti-HBs antibodies estimated to last for 5 years in the body.⁵ Effectivity the hepatitis B vaccine received by a person be determined by measuring the Anti-HBs titter in the body after vaccination.¹ Anti-HBs titers that can give immunity are more than 10 mIU/ml.³

Hepatitis B vaccination is given to babies aged 4 weeks at the first dose and



needs to give during adulthood, especially for health workers.^{6,7} Health workers have a high risk of hepatitis B transmission. Horizontal transmission of hepatitis B through blood transfusions, body fluids, contaminated syringes, razors, tattoos, and organ transplants.^{8,9} The profession as a medical laboratory technical analyst is a part of the health workforce that has a lot to do with examining body fluids, syringes and blood which has a high risk, so it is necessary to administer hepatitis B vaccine at an educational level with the aim of being able to form Anti-HBs before working in the laboratory.¹⁰

Anti-HBs laboratory tests by immunology using immunochromatography (ICT) methods can show the effectiveness of vaccinations received by a person. The measure to decide the effectiveness of the hepatitis B vaccine is to decide anti-HBs, so we need to know the effectiveness of vaccines in health analyst students who are vaccinated as a form of prevention against hepatitis B. The results of this study be provided anti-HBs information to health analyst students who have vaccinated whether or not to need the hepatitis B vaccine again or not.

MATERIALS AND METHODS

This research is a descriptive study that aims to decide Hepatitis B vaccination in Stikes Jenderal Achmad Yani Cimahi students. The population used in this study were students of Stikes Jenderal Achmad Yani Cimahi. The sampling technique used in this research is purposive sampling where selected sample was 30 students at level 1 of technology laboratory medic Stikes Jenderal Achmad Yani Cimahi with the inclusion criteria having vaccinated hepatitis B 3 times.

The researchers took 3 ml of student vein blood, then made serum by centrifugation for 15 minutes at 3000 rpm. Anti-HBs examination on serum samples using an immunochromatography test kit then the results comparing with controls.

A. Instrument and material

The instruments used in the study are centrifuge (Gemmy), Micropipette (Thermo scientific), and tourniquet (BD). Materials used in research is aquadest (Amidis), alcohol, alcohol swab, syringe (Terumo), plester, ICT Kit (Wondfo), vaccutainer tube (BD), polypropylene tube 1.5 ml (Eppendorf), Yellow tip (Thermo), Blue tip (Thermo), mask (Sensi)

B. Procedure

1. Perform venepuncture as follows ¹¹ :

Apply alcohol swab for 30 seconds and allow to dry completely (30 seconds). Alcohol is preferable to povidone-iodine, because blood contaminated with povidone-iodine may falsely increase levels of potassium, phosphorus, or uric acid in laboratory test results. Applying firm but with gentle pressure, start from the center of the venepuncture site and work downward and outwards to cover an area of 2 cm or more. Allowing the area to dry, if failed to allow enough contact time increases the risk of contamination. Not to touch the cleaned site; in particular, nothing places a finger over the vein to guide the shaft of the exposed needle. If the site is touched, repeat the disinfection. Anchor the vein by holding the patient's arm and placing a thumb BELOW the venepuncture site. Asking the patient to form a fist so the veins are more prominent. Enter the vein swiftly at a 30-degree angle or less, and continue to introduce the needle along the vein at the easiest angle of entry. Once sufficient blood has been collected, release the tourniquet before withdrawing the needle. Some guidelines suggest removing the tourniquet as soon as blood flow is established, and always before it has been in place for two minutes or more. Withdrawing the needle gently and apply gentle pressure to the site with clean gauze or dry cotton-wool ball. Ask the patient to



hold the gauze or cotton wool in place, with the arm extended and raised. Patient not to bend the arm, because doing so causes a haematoma.

2. Perform serum as follows:

The blood in the vacuum tube allows us to stand for 30 minutes at room temperature. Samples centrifuges for 15 minutes at 3000 rpm then the serum transfer to 1.5 ml polypropylene tubes.

3. Anti-HBs Test ¹²

Anti-HBs Test using Immunochromatography (ICT) method. Wondfo One Step HBsAb Serum/Plasma Test Cassette is a rapid immunochromatographic test for the visual detection of hepatitis B virus surface antibody (HBsAb) in serum/plasma samples. When the specimen is added into the test device, the specimen is absorbed into the device by capillary action, mixes with the antigen conjugate, and flows across the pre-coated membrane.

The device and specimen allowing to equilibrate to room temperature (10°C - 30°C) before testing. The testing device removed from the foil punch by tearing at the notch and place it on a level surface. The sample dropper held vertically and add four drops (80 µl-100 µl) of the specimen to the sample well. Read the results after 15 minutes, and make sure not to read the results after 30 minutes. Interpretation of Anti HBs rapid test results showed in Figure 1.

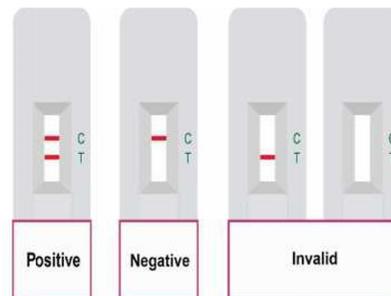


Figure 1. Interpretation of Anti HBs rapid test results
(Source: Wondfo, 2019)

Positive (+): rose-pink bands are visible in both the control region and the test region. A positive result indicates the concentration of HBsAb is equal to or higher than the detection limit of the test.

Negative (-): a rose-pink band is visible in the control region. No color band appropriate test region. A negative result indicates that HBsAB is zero or below the detection limit of the test.

Invalid: no visible band at all, or there is a visible band in the test region but not in the control region. Repeat with a new test kit. If the test still fails, please contact the distributor or the store, where you bought the product, with the lot number.

Data Collection and Analysis Techniques

Data collection through interviews before taking blood and then the results of laboratory tests conducted by the ICT method. Descriptive data analysis by looking at the relationship between hepatitis B vaccination and antibodies against hepatitis B in Stikes Jenderal Achmad Yani Cimahi's students.



RESULTS AND DISCUSSION

In this study using a sample of 30 people. anti-HBs examination in this study uses the examination method that is immunochromatography (ICT) to decide the effectiveness of hepatitis B vaccination. The results of the examination see in table 1.

Table 1. Results from HBsAb examination using Immunochromatography (ICT)

NUMBER	CODE	ICT RESULT
1	APS	Positive
2	ESA	Positive
3	TIN	Positive
4	DL	Positive
5	VNA	Positive
6	YN	Positive
7	NMR	Positive
8	TA	Positive
9	VAR	Positive
10	ASF	Positive
11	SSQ	Positive
12	NHM	Positive
13	SI	Positive
14	TN	Positive
15	MIM	Positive
16	RPA	Positive
17	RS	Positive
18	RAH	Positive
19	MWD	Positive
20	RGH	Positive
21	AAS	Positive
22	A	Positive
23	ZP	Positive
24	SPA	Positive
25	VFR	Positive
26	GNR	Positive
27	NSS	Positive
28	EN	Positive
29	GL	Positive
30	NAF	Positive

Based on table 1, 30 samples stated positive results containing anti-HBs. Results are expressed as a percentage using the following formula:

$$\begin{aligned}
 \text{Positive Results (+)} &= \frac{\text{Positive Sampel anti-HBs}}{\text{Total Sample}} \times 100\% \\
 &= \frac{30}{30} \times 100\% \\
 &= 100\%
 \end{aligned}$$

The study conduct at Stikes Jenderal Achmad Yani Cimahi with the criteria that respondents had vaccinated as much as 3 times. The research aims to detect anti-HBs antibodies after vaccination. Detection of anti-HBs antibodies in serum in



respondents based on qualitative analysis using the immunochromatographic examination (ICT) method. Based on research conducted there were 30 samples found positive there are anti-HBs antibodies in the body with a percentage of 100%. Booster or natural infection can increase antigen reserves at the germinal center, as a trigger for increased humoral immune response in the form of plasma cells and B cells memory.¹³ The response to primary infection is the presence of plasma cells produced by B cells into plasma cells and memory cells in the germinal centers of lymphoid tissue, then plasma cells migrate to the bone marrow while memory cells circulate throughout the body. When memory cells circulate back into lymphoid tissue that has similar antigens, the cycle of differentiation into plasma cells takes place faster so that antibodies with higher affinity and numbers are produced.¹⁴

The vaccine, which includes passive immunity, passive immunity may also be used as a preventive (prophylaxis) to boost the immune potential of those with compromised immunity or who anticipate future exposure to a particular pathogen, namely the hepatitis B virus entering the body.¹⁵ The vaccine content is an antigen that is weakened so that it does not cause a person to get sick but stimulates the body's immune system which is adaptive immune. to produce T lymphocytes and antibodies. Adaptive immune response has two types of immunity namely humoral immunity and cellular immunity, which mediate various components of the body's immune system to destroy disease-causing microorganisms that attack the body. Lymphocytes are one of the immune cells that have specific receptors for various antigens and are the key mediators of adaptive immunity Humoral immunity is found in B lymphocyte cells that produce antibodies. whereas in cellular immunity there are T lymphocyte cells associated with cells which will then look like they have an infection and cause mild symptoms, such as fever.¹⁶

The vaccine makes immunity in our body by inserting attenuated antigen. This attenuated antigen does not cause a response such as disease because the vaccine can stimulate the body to produce T-lymphocytes and antibodies to form immunity in the body. mild symptoms, such as fever is one of the effects obtained after giving the vaccine. These mild symptoms should normally exist as a form of response the body is forming immunity. After the infection from this vaccine disappears, the body has T lymphocyte cells and B memory B cells that have the ability to remember if there are the same antigens that have invaded the body.^{17,18}

Healthy people who get the vaccine will induce humoral and cellular responses so that an immune response that is able to protect themselves from the disease is achieved without having to wait for the development of an active immune response.¹⁹ To make this response the vaccine must be given in several doses and in the presence of booster or repetition so that protective titer is obtained. Especially for public health and safety workers who are at risk of getting blood or body fluids where the vaccine is usually given as much as 2, 3 to 4 injections within a period of 1 to 6 months. Within a period of years, individuals who are at risk of HBV infection (most of the work) need to be given booster immunization until reaching an anti-HBs protective titer of at least 10 IU / L (in most countries) or 100 IU / L (in the UK) . Anti-HBs titers are called protective titers if the titers reach above 10 mIU / mL. Some countries 100 mIU / mL anti-HBs levels have been retained with protective titer, to ensure that someone has received an immune response that is specific to anti-HBs.²⁰ Giving hepatitis B vaccine as much as 3 doses will be achieved antibody titer > 10 IU, but in some people, around 10% in adults and 5% in children this is not achieved.¹³

CONCLUSIONS

Based on the results of 30 anti-HBs test samples using immunochromatography methods, it was found that a positive result was found to have anti-HBs antibodies in the body of Stikes General Achmad Yani Cimahi with a percentage of 100%



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