

Incidence of Hepatitis B Surface Antigen (HBsAg) Infection and Its Relationship with Risk Factors at Janitors at Regional General Hospital dr. M. M. Dunda Limboto Gorontalo

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Abstract

Hepatitis B is an inflammatory liver disease caused by the Hepatitis B virus, which can be acute or chronic. The outer membrane protein of Hepatitis B Virus (HBV) is known as Hepatitis B Surface Antigen (HBsAg). Janitors are employees who are tasked with cleaning the hospital environment to keep it clean, because of the dangers that exist in hospitals, such as disease transmission, can occur if the hospital environment is not kept clean. The purpose of this study was to describe the results and their relationship to risk factors of the Hepatitis B examination on janitors at the Regional General Hospital (RSUD) dr. Mansyoer Mohammad Dunda Limboto Gorontalo. This study used a descriptive method with an accidental sampling technique. The sample in this study amounted to 33 respondents who met the inclusion criteria. Specimen were examined using the rapid test method. The data were presented descriptively and statistically to see the relationship between work and the incidence of Hepatitis B infection. The results obtained were as many as 33 respondents by conducting an HBsAg examination, with the results obtained being 2 reactive people and 31 non-reactive people. The results of statistical tests on the relationship between infection status and age showed a p-value of 0.019 and the relationship between infection status and symptoms showed a p-value of 0.002. The study's findings revealed that there was a substantial correlation between the respondents' reported symptoms and their infection status (6% of respondents tested for Hepatitis B).

Keywords

HbsAg, Janitors, Rapid Test Method, Regional General Hospital dr. M. M. Dunda Limboto.

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INTRODUCTION

The liver is the center of the body's metabolism, which serves a variety of purposes and is critical to sustaining life. The reserve capacity is very large, with only 10-20% of liver tissue that is still functioning, it is enough to maintain the body of the owner. The ability of the liver to replace dead tissue with new tissues (regenerate) is also quite large. Because of this, the removal of some diseased or damaged liver tissue is swiftly followed by the growth of new tissue. There are four different types of liver functions; the formation and excretion of bile, metabolism of substances important for the body, body defense, and vascular function (1). Hepatitis B is an inflammatory liver disease caused by the Hepatitis B Virus (HBV), which can be acute or chronic. Active chronic forms can lead to cirrhosis, liver cancer, to death. Hepatitis B is difficult to recognize because the symptoms are not immediately felt and some may not appear at all. For this reason, many people do not realize that they have been infected. This virus usually takes 1-5 months from exposure to the virus until the appearance of the first symptoms appear. Hepatitis B Virus Surface Antigen (HBsAg) is the outer envelope protein of HBV, and is a sign that the individual has been infected with HBV. HBsAg positive can be found in healthy people (healthy carrier), acute Hepatitis B,

chronic Hepatitis B, liver cirrhosis and primary liver cancer (2).

Based on the type, the causes of hepatitis are divided into two categories: infectious and non-infectious hepatitis. In non-infectious hepatitis, inflammation of the liver occurs due to non-infectious causes, such as chemicals, alcohol, and drug abuse. Non-infectious hepatitis, including drug-induced hepatitis, is not classified, as an infectious disease, because the cause of hepatitis is not caused by infectious agents such as fungi, bacteria, microorganisms and viruses (3). HBV transmission can also occur through blood transfusions contaminated with HBV and those who frequently receive hemodialysis. In addition, HBV can enter the body through cuts or abrasions to the skin and mucous membranes, for such as needle sticks or sharp object wounds, ear piercings, tattoos, needle stick treatment (acupuncture), self-injection habits, and the use of unsterile needles. The use of medical equipment and dental care equipment that is not properly sterilized can transmit HBV (4). HBV that enters the bloodstream through a portal of entry, such as lymph vessels enters the circulation. After reaching the blood circulation, the virus will spread throughout the body and finally reach the target organ, namely liver cells. The entry of the HBV particle occurs through a receptor-mediated process. Virions enter the cytoplasm, open the nucleocapsid, and then enter the

hepatocyte nucleus. The incomplete double-stranded viral DNA sequence becomes covalently intact DNA with the help of host cell enzyme activity, which not only "perfects" the viral DNA but also releases DNA polymerase virus. This DNA then becomes the template for forming RNA polymerase II, which produce RNA for the translation of proteins important to viruses. These proteins are then used for the encapsulation process and the formation of new viruses (5).

Based on the 2013 World Health Organization (WHO) report, two billion people in the world suffer from hepatitis, 240 million of them suffer from chronic hepatitis B and 1.46 million of them die. Deaths from this disease are comparable to HIV deaths (1.3 million), TB deaths (1.2 million), malaria deaths (0.5 million). However, hepatitis has not received the same level of serious attention as the three diseases. Data from the Indonesian Liver Research Association (PPHI) at the National Consensus for the Management of Hepatitis B in Indonesia shows that the prevalence rate of Hepatitis B in Indonesia is between 4.0-20.3%. Based on data from the Ministry of Health in 2013, nationally there were 2,981,075 (1.2%) of the population in Indonesia suffering from hepatitis. This condition had doubled from 2007 (6). Indonesia is the third- most country Hepatitis B in with the world sufferers, after China and

India with thirteen million sufferers, while in Jakarta it is estimated that one in twenty people suffer from Hepatitis B. Most of the population is infected with the HBV since childhood. A number of countries in Asia, 8-10% of the population suffer from chronic Hepatitis B (7). Indonesia is a country with endemic Hepatitis B in 2007, it was 0.6% of hepatitis cases and increased to in 2013 by 1.2% of hepatitis cases (8). According to Riskesdas data in 2018, districts / cities in Gorontalo Province, had a prevalence of hepatitis cases of 10,997, with a percentage of 0.55% (9). Data from regional public hospital (Rumah Sakit Umum Daerah, RSUD) of Dr. M.M. Dunda Limboto showed the prevalence of reactive hepatitis cases in 2019 was 2 reactive cases, 11 reactive cases in 2020, and 19 reactive cases in 2021. Hospitals are places that have complex potential hazards for workers. They produce large amounts of waste, some of which is hazardous to health in their environment. Hospital activities will produce waste, both solid, liquid, and gaseous waste containing pathogenic germs, chemical substances and medical devices, which are generally dangerous to the environment (1).

Hospital are one of the places of employment that are at danger since there is a chance that patients, staff members, and even visitors could contract infectious diseases there. Examples of infectious diseases that can occur in hospitals includes

Tuberculosis (TB), Hepatitis B, Hepatitis C, and HIV/AIDS. In addition to infectious diseases, hospitals also have other risks or hazards, such as explosion, fires, accidents caused by electrical installations, radiation exposure, toxic and hazardous chemicals, anesthetic gases, psychological and ergonomic related disorders. All of the potential hazards mentioned above can clearly interfere and cause a feeling of insecurity and discomfort for workers, patients, and visitors in the hospital environment (10). One type of work that is prone to accidents and occupational health problems is janitors work. Janitors are at high risk of experiencing health problems because they are directly exposed to garbage disposal, thus putting them at risk of being exposed to the HBV (11). Janitors are employees who are tasked with cleaning the hospital environment to keep it clean and minimize disease transmission. The job of cleaning the hospital environment makes the janitors vulnerable to exposure to hazards that can interfere with their health. According to Rita (12) it is explained that, when HBsAg was examined on 30 samples in Kendari City (Indonesia), 6.66% of the samples were reactive. This proves that janitors in hospitals are very much at risk of being infected with diseases due to things that are not taken into consideration when working, one of which is about the use of personal protective equipment when beginning work. Some of

the factors that cause workers to be reluctant to use personal protective equipment include difficulty to use, discomfort, lack of understanding of the importance of safety equipment, and indiscipline in use. The aim of this research is to describe the results and their relationship to risk factors of the Hepatitis B examination on janitors at the Regional General Hospital (RSUD). dr M. M. Dunda Limboto Gorontalo.

MATERIALS AND METHODS

Study Design and Area

The type of research used is descriptive-analytical. The study was conducted from February to May 2022. Sampling and examination were carried out in the laboratory of the Regional General Hospital Dr. M. M. Dunda Limboto Gorontalo. Respondents in this study were janitors. Approval for this study was obtained from the Health Research Ethics Committee of Manado Health Polytechnic Ministry of Health No. KEPK.01/05/080/2022.

Sample Size Determination and Sampling Techniques

The sample used was the total population that met the inclusion criteria; there were as many as 33 respondents, selected using the accidental sampling technique. Primary data was obtained from interviews with respondents and the results of laboratory examinations of HBsAg samples and

secondary data was obtained from journals and literature related to this study.

Data Collection Tool and Methods

The tools and materials used in this study were immunology tubes, tube racks, tourniquets, centrifuges, 1 mL mini pipettes, timers, masks, 3 mL disposable syringes, alcohol swabs, dry cotton, HBsAg strips and gloves. The materials used in this study were serum samples obtained using the immunochromatography test or rapid test method. Sampling was carried out in the morning after filling out the questionnaire.

Specimen Collection and Processing

Whole blood was collected by venipuncture using vacutainer tubes, with (BD Vacutainer® containing the anticoagulant EDTA). Serum samples were taken after kept at 4° for 30 minutes and the examined in the laboratory of the Regional General Hospital Dr. M. M. Dunda Limboto.

Serological Test

The examination method used was the Immunochromatography test or Rapid Test method, where the serum sample was observed for the results through the presence or absence of a red line. The results were then interpreted as Reactive interpretation if two red lines were formed in the control (C) and test (T) areas; and Negative if a red line was formed in the control area (C). If no line was formed on the strip, it was declared invalid and the test had to be repeated.

Data Analysis

The data were collected, processed, analyzed descriptively, and statistically using the SPSS program to examine the relationship between variables then presented in tabular form, narrated, and concluded.

RESULTS

The HBsAg examination in this study was carried out on 33 respondents who were taken from the janitors of RSUD. dr. M. M. Dunda Limboto. The results of the laboratory examination of the respondents showed a reactive result of 6% (Table 1).

Table 1. Frequency of HbsAg Test Result

Result	Frequency (N)	Frequency (%) Occurrence
Reactive	2	6
Non-Reactive	31	94
Total	33	100

According to research findings based on gender, respondents were predominantly female, numbering up to 21 (64%) and men, numbering up to 12 (36%). See Table 2 for more information.

Table 2. Distribution of Respondents According to Gender

Gender	Frequency (N)	Percentage (%)
Man	12	36
Woman	21	64
Total	33	100

Based on Table 3, the majority of respondents were in the age range of 21-30 and 31-40 with a total of 61% each.

Table 3. Distribution of Respondets by Age

Age Group	Frequensy (N)	Percentage (%)
21 - 30	7	21
31 - 40	20	61
41 - 50	6	18
Total	33	100

Table. 4 showed no significant relationship between infection status and the respondent's age. According to Table 5 regarding the symptoms of hepatitis, it showed that the majority of respondents (90%) did not feel any symptoms of hepatitis.

Table 4. Relationship Between Status Infection with Age

Result	Age (year)			Total (%)	p-Value
	21-30 (%)	31-40 (%)	41-50 (%)		
Positive	2 (6)	0	0 (0)	2 (6)	0.019
Negative	5 (15)	20 (61)	6 (18)	31 (94)	
Total	7 (21)	20 (61)	6 (18)	33 (100)	

Table 5. Distribution Respondents Based on Disease Symptoms

Symptoms of Hepatitis	Frequency (N)	Percentage (%)
Feel Symptoms	2	6
No Feel Symptoms	31	94
Total	33	100

Table 6 shows the infection status along with symptoms. The statistical test results showed that there was a

relationship between infection status and the symptoms experienced.

Table 6. Relationship Between Infection Status with Symptom

Result	Symptom		Total (%)	p-Value
	Yes (%)	No (%)		
Positive	2 (6)	0 (0)	2 (6)	0.002*
Negative	0 (0)	31 (94)	31 (94)	
Total	2 (6)	31 (94)	33 (100)	

*signifikan if p-value <0.005

DISCUSSION

Regional General Hospital (RSUD). Dr. M.M Dunda Limboto, originally named

Limboto General Hospital, is a hospital owned by the Gorontalo district government located in the administrative area of

Gorontalo Regency, founded on November 25, 1963, now accredited B.

This study began with filling out informed consent. In this study, the sample used was a venous blood sample, which was taken by performing a phlebotomy with an open system. Three milliliters of blood were transferred to an immunology tube and then centrifuged for 10-15 minutes. The method used was the Immunochromatography method by looking at the red lines in the Control Area (C) and the Test Area (T).

Janitors are at risk of being infected with infectious diseases due to small factors that are not taken into consideration when working, such as the use of personal protective equipment when starting work and whether the janitors has previously suffered from hepatitis.

The results of this study are contradicted research conducted by Rita (12) where the majority of respondents were male, at 60%. This research is in line with the proposed by Bertelli (12) that the female sex is more susceptible to the effects of infection due to the low level of cell-mediated immunity in women and their physical weakness compared to men. Research conducted on work accidents caused by biological materials shows that they occur mostly in female workers who have low education and employed in the health sector (13).

Research conducted by Rita (12) showed that the highest cleaning service at from the

age of 26 - 30. Research conducted by Indarti (14) showed that the majority of respondents were between the ages of 21-30 years, indicating that most of the workers were dominated by young people (15). Human age can be classified into several groups, each of which describes a stage of human growth. One of the age group divisions or age categories issued by the Ministry of Health of the Republic of Indonesia on its official website, namely depkes.go.id as follows: infancy, childhood, early adolescence, late adolescence, early adulthood, late adulthood, early elderly, late old age and old Age. At the age of 20 years and over, the maximum oxygen capacity in the body will gradually decrease. At the age of around 50-60 years, the ability of muscle strength will decrease, resulting in a decrease in the body's physical ability to do work (15). Research conducted in China showed that 90% of cases of HBV were experienced by the population over the age of 20 years (17).

All age groups can be at risk of experiencing Hepatitis B infection, as transmission of the virus can occur through actions, behaviors, or habits. Table. 4 shows no significant relationship between infection status and the respondent's age. Research conducted by Amtarina et al (18) showed that respondents who had Hepatitis B infection were typically 20 years of age or older.(18). Hepatitis B in children can occur acutely or chronically, and transmission can occur

vertically through childbirth and intra-uterine. However, the incidence of acute Hepatitis B infection in children and adolescents is low due to vaccine administration in childhood (19).

Based on the results of interviews with respondents, it was shown that none of the respondents had received the Hepatitis B vaccine. Similarly, research conducted by Samiun (20) found that most respondents had not received the Hepatitis B vaccine compared to those who had received the vaccine. According to these findings, people who have never received a Hepatitis B vaccination have a higher risk of contracting the disease. This is in line with the theory that the administration of the Hepatitis B vaccine can prevent both Hepatitis B and illnesses like liver cancer and cirrhosis that are brought on by Hepatitis B. One method of preventing the spread of Hepatitis B is vaccination.

Currently, there are two forms of immunization available; active immunization and passive immunization. Active immunization is achieved by administering the Hepatitis B vaccine, which contains purified HBsAg. This HBsAg is taken from purified serum of Hepatitis B patients or from the recombination of yeast cell DNA. Hepatitis B vaccination can provide protection against Hepatitis B infection for more than 20 years. The success of the vaccination is assessed by the detecting completing the Hepatitis B immunization

(3-4 times) (19). The Hepatitis B vaccine (Recombivax HB, Comvax, and Engerix-B), which is a vaccine made from an inactivated virus, can be given three or four times within six months (21). Vaccines are one way to prevent infections by germs such as bacteria and viruses from entering our bodies (21). Since 1997, the government has supported the national immunization program as a means of preventing the spread of Hepatitis B. Workers in the health industry, including cleaning officers, should have received the. Hepatitis B vaccine is given to prevent the occurrence of Hepatitis B (23).

Not everyone who is infected with HBV develops symptoms of hepatitis. Between 30 and 40 percent of people infected with this virus do not experience any symptoms. If there are symptoms. They usually appear within four to six weeks after infection and can last from several weeks to several months. Some people who experience symptoms of acute hepatitis B feel so sick and tired that they cannot do anything for weeks or months. If the immune system is unable to control HBV infection within six months, symptoms of chronic hepatitis B may appear. Not everyone with chronic hepatitis B experiences symptoms. Some people may occasionally experience symptoms that go away after a while, while others may experience persistent symptoms. Symptoms of chronic Hepatitis B can be similar to those experienced with acute

Hepatitis B. These symptoms tend to be mild to moderate and are usually temporary. Additional symptoms may occur, especially in people who have had chronic Hepatitis B for a long time. These symptoms include rashes, hives (an allergic reaction characterized by itching, red spots and swelling), arthritis (inflammation of the joints), and polyneuropathy (tingling or burning sensations in the arms and legs) (22).

The statistical test results showed that there was a relationship between infection status and the symptoms experienced. Histopathologically, Hepatitis B is classified into persistent chronic Hepatitis B, chronic lobular Hepatitis B, and active chronic Hepatitis B. All three can develop into cirrhosis and primary liver carcinoma. The clinical symptoms of Hepatitis B depend on the severity of the infection. The course of Hepatitis B infection consists of several phases, namely the incubation phase, the acute phase, the convalescent window phase and the healing phase. HBV is transmitted through percutaneous and mucous membranes infected with body fluids containing the virus. The virus can survive for more than one week on dry surfaces, thereby increasing the risk of infection (23).

Personal Protective Equipment (PPE) is a set of tools used by workers to protect part or all of their body from potential hazards or work accidents. PPE is equipment used to protect healthcare workers from

microorganisms that cause infection. The use of PPE is very influential in the transmission of disease. The risk of nurses contracting diseases such as hepatitis HIV/AIDS increases if the use of PPE is neglected, resulting in a risk of infection. Hepatitis and HIV/AIDS can attack nurses if they do not use PPE due to exposure to body fluids or puncture needle (25). The greatest risk of transmission through needle sticks is experienced by healthcare workers and cleaning staff in health facilities (25). According to research, the causes of workers not using Personal Protective Equipment (PPE) are weak management and supervision, sanctions, lack of facilities and infrastructure, carelessness or negligence of humans, and inconvenience (21). Some of the factors that influence workers' reluctance to use personal protective equipment include difficulty, discomfort, disturbance when using it; low understanding of the importance of safety equipment and indiscipline in its use (1).

To improve the health of employees and their families by performing routine checks, administering vaccinations, wearing PPE at work and properly disposing of used needles. Employees is also washing hands before and after working to prevent the spread of disease in the workplace.

There are several methods of examining the HBV, and the Rapid Diagnostic Test (RDT) method is one that can be used with

good sensitivity and specificity results. The RDT method is cost-effective (27). It can be used for examinations aimed at treatment but is not recommended for screening tests for potential donors (28).

CONCLUSIONS

Examination of Hepatitis B surface antigen (HBsAg) using the immunochromatography test method at the janitors working at RSUD dr. M. M. Dunda Limboto obtained 31 non-reactive samples (94%) and 2 reactive samples (6%). There is a significant relationship between infection status and symptoms reported by the respondents.

AUTHOR CONTRIBUTIONS

Indra Elisabet Lalangpuling: Conceptualization, Methodology, Software. Zumrotul Abidah Dakio: Data curation, Writing-original draft preparation Software. Nikma: Validation. Dwi Setiyo Prihandono: Supervision. Lendawati: Writing, Reviewing and Editing.

CONFLICT OF INTEREST

The author declares there is no conflict of interest.

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