

Threat Analysis of Nipah Virus as a New Pandemic from the Perspective of Medical Intelligence

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Abstract

According to World Health Organization (WHO), Nipah virus is a type of infectious disease from 10 types of infectious diseases that can pose a risk to the public health. Besides, it has the potential to become a new pandemic. The State Intelligence Agency has the authority, mandate, and responsibility to actively engage in early detection of a disease that could potentially become an epidemic and cause a threat to national security and interests. The formulation of this research problem is "Threat Analysis of Nipah Virus as a New Pandemic from the Perspective of a Medical Intelligence." The authors used a qualitative descriptive method approach through interviews and literature studies related to Nipah virus research. The results of the research indicated that the Nipah virus has the potential to become a new pandemic that can threaten the Indonesian people health and even the world. Thus, early detection of the Nipah virus spreading in Indonesia is necessary, by collaborating across ministries in implementing preventive measures using a one health concept approach.

Keywords: Nipah Virus, Threat, Pandemic

1. Introduction

In Indonesia, there are 37.000 islands extending from Sabang to Merauke, a diverse range of flora and fauna contributes to the country's wealth (Zamroni et al., 2020). One of the *fauna* in question is bats as a type of mammal that is spread and easily found in various regions of Indonesia. Bats consists of various different species in each region in Indonesia (Alam, 2022; Maretalinia et al., 2023; Talukdar et al., 2023). They are fruit-eating animals or are known as *fruit bats*. They are an animal of global concern because they can carry emerging and re-emerging disease. All viruses found in animals can be transmitted to humans, which can then provide the potential for human-to-human transmission, including the Nipah virus (Aditi & Shariff, 2019; Hauser et al., 2021; Sharma et al., 2019). There are several factors that cause a virus to become an epidemic, one of which is the level of virulence of the virus, the form and method of transmission, the level of mortality, and mortality from the disease caused. In this current condition, numerous viruses, such as *arenaviruses*, *alphaviruses*, *reoviruses*, *rhabdoviruses*, and *paramyxoviruses* have been detected and found in the bodies of bats (Field et al., 2007). Bats have been proven to be *reservoir hosts* for *emerging zoonotic* diseases, one of which is Nipah. This can cause fatalities for humans and animals' condition when infected with its virus (Chua, 2000; Kardena, I., Sukada, 2014; Lipin et al., 2021).

Indonesia is concerning to the presence of Nipah disease as it appears close to the location of Indonesia, namely in Malaysia. Indonesia is geographically very close to Malaysia, making the possibility of disease transfer to Indonesia from Malaysia can occur and cause various means, such as the movement of wild animals, which is predominantly caused by bats and the importation of livestock and their products (Breed, 1948). From these conditions, it can be ascertained that the presence of bats in an area as carriers of Nipah disease must be taken seriously and monitored (Angeletti et al., 2016; Luo et al., 2023; Pillai et al., 2020).

Nipah can be stated to be an exotic and dangerous disease, especially for human health. It can have a real impact on the economic, political, and social factors. Nipah virus is caused by Nipah disease, namely as a *ribonucleic acid* (RNA) virus and belongs to the *morbillivirus* genus and *family paramyxoviridae* (Kardena, I., Sukada, 2014). As animals, bats have been proven to have a very decisive and important role in the occurrence of the Nipah

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outbreak in Malaysia, where bats in this case act as the *reservoir hosts* for the *Nipah Virus* (Chua, 2000). The potential for a pandemic can be caused by the Nipah virus, an RNA virus of the *Paramyxovirus* group which can cause pandemics such as pneumonia, mumps, and measles. The Nipah virus comes from wild animals of fruit bats, pigs, goats, and sheep which have been infected by the virus. Transmission of the Nipah virus occurs when humans touch infected animals through saliva, blood, and urine. Humans can also become infected when consuming meat from animals infected with the Nipah virus, particularly when the animal meat is not cooked thoroughly. Transmission of the Nipah virus can occur from animals to humans, but it can occur or transmit between humans by means of transmission being contact between humans and patients who have been infected with the Nipah virus. Nipah disease is a potential health threat because its disease is caused by Nipah virus infection and has been endemic in Southeast Asian countries with its epicentre around the Nipah river. Malaysia becomes the first possible transmission of the Nipah virus, which then spread to other regions in Indonesia through infected fruit bats. It can be the vectors of the virus migrating from the Malaysian region to the Indonesian region close to Malaysia.

The conducted research shows that fruit-eating bats in Indonesia have been infected with the Nipah virus, whereas in Medan, Java Island, and West Kalimantan are known that the *Pteropus vampyrus* species contains antibodies on the Nipah virus with a prevalence rate of 18% -30%. The test was carried out through the ELISA serology test (Sendow & Adjid, 2005). Several reasons why the Nipah virus is a threat because the incubation period for the Nipah virus generally takes three days to fourteen days in each case. Thus, there is an opportunity for many hosts to be infected and not realize they are sick and spread. Many types of animals can be infected by the Nipah virus, which allows it to spread quickly, both through direct contact and by consuming food that has been contaminated with the Nipah virus. A human who has been infected with the Nipah virus shows symptoms related to breathing, coughing, fever, lethargy, sore throat, brain swelling, convulsions, and even death. As a result, it can be said that Nipah disease is a threat to human health which is very dangerous if it spreads. This cannot be prevented.

According to the World Health Organization (WHO), Nipah virus infection refers to a type of infectious disease from 10 types of infectious diseases. It is included in 16 diseases that can pose a risk to public health. The spread of the Nipah virus can be anticipated by health authorities through increasing *surveillance* epidemiology of infectious diseases, which can be carried out by systematic and continuous analysis of diseases or health problems with conditions that can influence the increase in transmission of the disease. This aims to ensure that effective and efficient preventive measures can be taken through *surveillance* on the Nipah virus. This can be an important action because there are no typical clinical symptoms in humans infected with the Nipah virus. There are even cases that do not show symptoms, which are ultimately difficult to distinguish from symptoms of general disease. The Nipah virus could be the potential for the next pandemic, such as the Covid-19 pandemic, which is currently occurring. Although the Nipah virus in Indonesia has not been detected in humans, it is necessary to carry out prevention and control efforts because of the possibility that all viruses can be transmitted from animals to humans. It continues from Human-to-human transmission and has the potential to become a pandemic. This condition is determined by several factors, namely the method of transmission, the level of virus virulence, the mortality rate, and the disease caused, the human immune response, human behavior patterns, the level of *surveillance* readiness health, as well as the health systems in patient care.

Based on law Number 17 of 2011 concerning state intelligence, it is stated that the State Intelligence Agency (BIN) has the authority to form a task force (*Satgas*) to carry out the implementation of intelligence activities, which can be seen in Article 30 letter d. It is known that threats in the health sector are part of human security threats, which are one of the areas of work of the State Intelligence Agency. Based on these conditions, the State Intelligence Agency needs to actively participate in predicting and carrying out early detection of the possibility of a Nipah virus pandemic. Article 31.a also states that the State Intelligence Agency is authorized by the Government to carry out the process of gathering information regarding threats to national security and interests. Article 34 states that the State Intelligence Agency carries out intelligence functions in terms of collecting and extracting information as an effort to obtain complete and accurate information through the use of techniques and methods for collecting information directly from the field.

Intelligence has an important role in detecting an outbreak, such as if the Nipah outbreak entered Indonesia, the role of intelligence as one of the national security actors, one of which is the possibility of the misuse of microorganisms as weapons of mass destruction or the threat of the Nipah outbreak should it enter Indonesian territory. Indonesia is a tropical country and has many tropical forests, which are one of the world's lung countries. These tropical forests contain numerous types of flora and fauna as the natural wealth, which is important for research for Indonesia's future progress, but the richness of fauna such as exotic animals in tropical rainforests could also become a problem in the

future if they are not managed and controlled properly, as in the last decade zoonotic diseases have experienced an increase in disease outbreaks or *emerging infectious diseases* (EID), such as the Nipah disease outbreak.

Nipah disease can be a serious threat to human health in Indonesia, as is currently being faced by the Covid-19 pandemic, which is able to paralyze the health aspects of countries in various parts of the world. Due to paralyzed health, such conditions can be dangerous, disturbing, and even detrimental to the country. In the future, this situation will become a concentration of intelligence, where outbreaks must be detected early. The Nipah outbreak caused by the Nipah virus can be categorized as a threat, which can be dangerous, disturbing, and even detrimental to the country, as same as the Covid-19 pandemic. The Nipah virus has a higher rate of transmission and mortality so it is necessary to be aware and early detection. Threats to human health are classified as invisible, non-physical or non-conventional threats, where to observe the microorganisms that cause outbreaks or diseases, special tools or instruments are required. Medical threats can be classified into two categories, the first category is natural medical threats, meaning that microorganisms or pathogens naturally emerge into diseases or outbreaks can be influenced by natural phenomena, such as natural mutations due to changes in the environment or ecosystem, the second category of non-natural medical threats are microorganisms or pathogens that are deliberately created or modified so that they are able to cause diseases that can outbreak. The State Intelligence Agency's efforts to carry out its duties and functions to tackle potential Nipah disease outbreaks include those carried out in resolving the Covid-19 outbreak.

2. Literature Review

In general, intelligence can be said to be an effort or activity carried out using special and organized methods to obtain a product in the form of knowledge about various problems faced, which is then presented to leaders or users to serve as material for decision making. Law Number 3 of 2003 concerning State Land, where in the law, it is explained that "Threats are activities and businesses whether within the country or abroad which have the potential to pose a danger to state sovereignty, state integrity, and state safety. There are 3 (three) considerations that can be made in evaluating threats, namely capability, intensity, and ease of attack. The definition of analysis can be defined as an effort or strategic planning method used to assess or evaluate various aspects, including strengths, weaknesses, opportunities, and threats that will occur in a particular environment as a complete analysis. This is based on the assumption that an effective strategy will maximize strengths and opportunities as well as minimize weaknesses and threats. When implemented accurately, this simple assumption has a profound impact on the design of a successful strategy. A pandemic can be explained as a condition of an infectious disease in a country or several countries that is simultaneously affected by the same outbreak, which can be caused by a pathogen in the form of a virus or other disease that is dangerous and deadly. Nipah virus (Niv) is a zoonotic virus that can spread to both animals and humans. Fruit bats, also called flying foxes (*genus Pteropus*) are the reservoir of Niv in nature. It is also known to cause disease in pigs and humans. Niv is a member of the *Paramyxoviridae* family, *Henipavirus* genus, and Nipah *Henipavirus* species. Niv is genetically related to the Hendra virus, which is another type of Henipavirus carried by bats. Transmission or infection to humans can occur through close contact with infected animals or body fluids (saliva or urine). Outbreaks or extraordinary events (KLB) of Niv occur almost every year in parts of Asia, especially Bangladesh and India. Niv was first discovered in 1999, an outbreak in pigs, Malaysians and Singaporeans. This outbreak caused 300 cases of infection in humans and more than 100 deaths. Many pigs were killed to help control the outbreak.

3. Research Methods and Materials

In this research, the authors used a qualitative descriptive method approach. This is the most appropriate method in exploring the analysis of this research because it more emphasized on subjective human experiences. This methodology becomes a research procedure that produces descriptive data in the form of written or spoken words from the experts. Data analysis techniques aim to answer problem formulations and research hypotheses that have been previously formulated. The data that has been collected was then processed so that conclusions can be drawn according to the type of test. In this research, the researcher carried out a data analysis that had been obtained from the results of interviews, which were then described in the form of paragraphs or narrative writing. Then, it is systematically arranged the data obtained from the results of interviews with experts and literary studies. Last, drawn a conclusion from the data that had been obtained, collected, and verified those conclusions.

4. Results and Discussion

The natural reservoir for the Nipah virus comes from fruit bats belonging to the genus *Pteropus*. Research on the Nipah virus is still limited in Indonesia when compared with research on other viruses. The existence of the Nipah virus has the potential to become a major disease outbreak because it is caused by the presence of fruit bats as a natural reservoir for the Nipah virus, which is often found in Indonesia. Although there have been unknown reports of disease outbreaks caused by the Nipah virus in Indonesia, it is realized that the Nipah virus is a biological agent that must be analyzed using a laboratory with maximum security, in this case Bio Safety Level 4. This may result in decisive monitoring, which must be carried out carefully to prevent Nipah disease occurring in Indonesia now or in the future. There are several reports mentioned that the Nipah virus has the potential to become an outbreak and pandemic as happened in the Covid-19 pandemic (Aditi et al., 2017). Since the confirmed positive cases of Nipah virus occurred in Southeast Asia and South Asia, where the first case of 20 years of recording since the study was conducted occurred in the territory of Malaysia in 1998, the first case in Singapore was found in 1998. In India, the first case was found in 2000, then the first case was found in 2001 in Bangladesh, and 2004 was found in the Philippines, which was accompanied by the rolling of time. There were additional cases of Nipah virus transmitted to humans by direct contact, causing the number of positive Nipah virus confirmations to increase and the mortality rate to increase as well, which in turn caused the Nipah virus to become a cause of emergency disease and becoming a WHO concern from several global diseases.

The mortality rate is lower if it is related to the death rate. If an individual is confirmed positive for the Nipah virus, then the common symptoms known are respiratory problems, encephalitis, and difficulty breathing as well as pain in the chest. On the other hand, humans who have a penchant for consuming fruit bats, bats, pigs, they can have the potential to be infected with the Nipah virus if it is known that the animal has the Nipah virus. These animals can become a host for the Nipah virus in order to obtain a suitable place to live or develop, which then spreads to the human body. It was reported that there was a virus that had been confirmed positive for the Nipah virus in Indonesia when a biological test was carried out. According to Sendow & Adjid (2005) reported on research that had succeeded in detecting the presence of the Nipah virus via RT-PCR. The Nipah virus can be detected from test results on large bats (bats) found and living in the Medan area.

As a natural reservoir, bats do not show any symptoms but the presence of the virus can be found in saliva, semen, urine, and feces. One serological study has proven that there is evidence of Nipah virus infection in several species of bats, both insect-eating bats and fruit-eating bats. Several bats are reported to be bats originating from Malaysia, India, Cambodia, Thailand, and Indonesia. It is known that molecular detection of viruses is usually successful in *Pteropus* species. sp. The transmission of the Nipah virus varies from country to country, where in the outbreak that occurred in Malaysia from 1998 to 1999. Some infections occurred in humans are due to direct contact with sick and contaminated pigs. The Nipah virus strain can be identified and is caused by pigs eating fruit that has been contaminated by bats. In humans, transmission occurs through direct contact via droplets because humans come into contact with processed pork and other products that contain the its virus. Nipah virus disease has an incubation period of between 4 to 14 days and some also have an incubation period of up to 45 days. The mortality rate in cases of Nipah virus disease is between 40% and 75%, where the symptoms that occur in Nipah virus infection vary from mild to severe ARI and fatal encephalitis. Most likely the infection begins with flu, headache, fever, muscle aches, sore throat, and vomiting with subsequent symptoms of dizziness, impaired consciousness, drowsiness, neurological signs with acute encephalitis. Some people show symptoms of atopic pneumonia and severe respiratory problems. In very severe cases, seizures and coma occur within 24 hours to 48 hours and can cause death.

Monitoring, controlling, and preventing the development of Nipah virus disease cannot be separated from efforts to prevent and alert as early as possible. The information obtained can be used as material to update the latest information which can be carried out through WHO through its official website find out which regions and countries are included in the KLB. The government through the ministry of health from each country infected with the Nipah virus disease. Electronic media or print media to find out developments related to Nipah virus disease.

For the target areas, where there are still many traditional pig farms, by tying them under trees, eating fruit from infected bats can cause pigs to be contaminated and their excrete urine or feces and saliva can infect humans through direct contact. Fruit bats that have been infected and formed the Nipah virus can cause very detrimental impacts on the social, economic, and environmental health aspects of society. Therefore, risk management efforts need to be made to overcome the threat of a pandemic. The possibility of the Nipah virus becoming a pandemic in Indonesia in particular and in Southeast Asia in general is noteworthy by making efforts to detect early the development of the virus in its host animals and to know and understand the areas affected by the risk of Nipah virus disease. Early

detection and analysis of the development of the Nipah virus disease in an area can be carried out using continuous monitoring methods.

The health sector plays an important role with substantial influence and significant impact, particularly in the preparedness for addressing the Nipah virus. Trained medical personnel equipped with adept knowledge of health protocols are crucial in mitigating the risks associated with the Nipah pandemic. These professionals are indispensable for both technical and non-technical aspects of handling the situation, encompassing direct patient care for those with close contact or confirmed exposure to the Nipah virus. Additionally, their expertise is instrumental in providing swift health assessments for individuals seeking to ascertain their health status promptly through tests and PCR. Health workers are even needed to treat people who have died due to the impact of being infected with the Nipah virus, while health workers are needed to input data into the system provided by the government during the Nipah virus pandemic.

A pandemic is not an ordinary outbreak that only damages the body's protective cells and human health in common but also has a major impact on the social structure and culture of society. The pandemic will cause social anxiety and serious social problems to the social growth, especially if the mortality rate is high, then it will create a different atmosphere in society such as fear to panic, which leads to psychosomatic conditions for a person or a group. The local community also experienced panic buying condition by a number of basic necessities in shopping centers, resulting in limited health equipment, which can increase people's psychological pressure.

The Nipah pandemic will cause significant changes in the rotation of the economic wheels, changes in industrial production patterns, in distribution patterns, people's basic needs, as well as changes in supply and demand for goods and services. These changes will have an impact on reducing economic growth. This economic decline will cause an increase in unemployment, especially in the micro and small business sector and home industry. It means that the economic activities of small and medium enterprises (SMEs) will be most affected due to this condition. The next impact is related to the weakening of the regional and national economy. The impact of the next change is a decrease in tax revenues and national income, slowing economic growth is a challenge for regional and national governments when the Nipah pandemic occurs.

5. Conclusion

Medical intelligence efforts in analyzing the threat of the Nipah virus as a new pandemic with a medical intelligence perspective because the Nipah virus outbreak that has occurred in Southeast Asia needs significant attention from the livestock industry and public health. Detecting virus dynamics in hosts needs to be known and understood in the study area to analyze the level of establishment or even be able to predict the consequences of virus establishment. These detection and analysis actions of virus dynamics in an area can be done by conducting surveillance methods. These efforts can provide reservoir sampling of animal and human risk populations to study whether Nipah virus transmission is possible or has occurred between them. Moreover, surveillance initiatives can also provide an indication of early reporting systems, which can provide rapid warnings and prevent the spread of disease and also to protect the economic integrity of the relevant swine industry. The world organization for animal health (OIE) states that surveillance is a necessity when the introduction of exotic disease levels needs to be evaluated. The factors that lead to the threat of the Nipah virus becoming a new pandemic are because the its virus is very worrying if this disease breaks out on a large scale. Nipah Virus is a zoonotic virus belonging to the *Paramyxoviridae* family, *Henipavirus* genus, and animal host reservoir. A threat analysis of the Nipah virus as a new pandemic has been carried out by the State Intelligence Agency. It is known that there is a possibility that the Nipah virus will become a very large outbreak as it is caused by the presence of reservoir animals, which are abundant in Indonesia, namely fruit bats, bats and pigs, so the intelligence needs to carry out early detection from this condition.

From the conclusions above, several recommendations can be put forward as follows for further research, what is considered important is to carry out mapping of zoonotic diseases, such as Nipah in various regions in Indonesia, so that outbreaks of emerging and reemerging diseases can be anticipated. In addition, building sustainable veterinary laboratory capacity of animal health laboratories capacity building in Indonesia is also no less important in preparing for zoonotic diseases. State intelligence must participate in preventing and overcoming every threat that disrupts national security. Through this suggestion, the threat of the Nipah pandemic and other infectious diseases which disrupt public health and have a widespread impact, must be anticipated and overcome in order to achieve the safety and existence of the nation and state. For the parties concerned, it is necessary to concern that the Nipah Virus has a reservoir in fruit bats, which is found almost all over the world. Transmission occurs from fruit bats to pigs, other

animals and humans through contaminated urine and feces, and it is suspected that there is human-to-human transmission. Until now, there is no vaccine or specific therapy to overcome the Nipah virus.

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