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Knowledge, Attitude and Preparedness Towards Nipah Virus Infection among Undergraduate Students at A University on the East Coast of Malaysia

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ABSTRACT

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Background: Nipah virus infection (NVI) is a zoonotic disease caused by Nipah virus, a Henipavirus within the family Paramyxoviridae. The virus was first identified in Malaysia and remains a public health concern because of its high fatality rate, limited specific treatment options and the absence of licensed vaccines. Evidence on students' knowledge, attitudes and preparedness towards NVI in Malaysia remains limited, particularly among future health professionals.

Methods: A quantitative cross-sectional study was conducted among 391 undergraduate students at the International Islamic University Malaysia (IIUM) Kuantan Campus, Pahang, Malaysia. Data were collected using an English self-administered questionnaire adapted from a previous study and distributed via Google Forms. Data were analysed using IBM SPSS Version 27.

Results: Overall, 40.4% respondents had good knowledge, 77.5% respondents had good attitudes and 76.0% respondents had good preparedness towards NVI. Kulliyah was significantly associated with knowledge level ($p = 0.021$), attitude level ($p = 0.022$) and preparedness level ($p = 0.028$). Gender was significantly associated with attitude level ($p = 0.008$), while year of study was not significantly associated with knowledge, attitude or preparedness levels.

Conclusion: The respondents generally demonstrated good knowledge, attitudes and preparedness towards NVI. However, misconceptions were identified, particularly regarding vaccine availability, antibiotic treatment and possible transmission routes. Targeted educational interventions are recommended to strengthen outbreak preparedness and improve accurate understanding of NVI among undergraduate students, especially those who may become future healthcare providers.

Keywords: Nipah virus; Zoonotic infection; Knowledge; Attitude; Preparedness; Undergraduate students

INTRODUCTION

Nipah virus infection (NVI) is a zoonotic disease caused by Nipah virus (NiV), a biosafety level 4 pathogen under the genus *Henipavirus* within the family *Paramyxoviridae* (1). Fruit bats, particularly *Pteropus spp.*, are recognised as the natural reservoir hosts of NiV (1,2). The virus was first identified during the 1998-1999 outbreak in Kampung Sungai Nipah, Malaysia, before subsequent outbreaks were reported in Singapore, Bangladesh and India (1,3,4).

NiV can be transmitted to humans through direct contact with infected animals, particularly pigs during the Malaysian outbreak, exposure to bat secretions, consumption of contaminated food such as raw date palm sap, and close contact with infected individuals (5-7). Clinical manifestations range from asymptomatic infection and influenza-like illness to severe respiratory disease, encephalitis, seizures and coma (1,8,7). Case fatality rates reported across outbreaks are high, commonly ranging from 40% to 70%, with some settings reporting even higher mortality depending on outbreak context and healthcare capacity (1,3,8).

There is currently no licensed vaccine or specific antiviral treatment for NiV infection; management remains mainly supportive, particularly for severe respiratory and neurological complications (10). Therefore, prevention depends heavily on public awareness, risk communication, early recognition, appropriate hygiene practices, avoidance of high-risk exposures and preparedness to respond to possible outbreaks (6,10,11).

Although Malaysia has not reported human Nipah virus cases since 1999, the country remains historically important in the emergence of the disease. The resurgence of the virus in neighbouring regions highlights the need to maintain public health vigilance, particularly among health and science undergraduates who represent future healthcare workers, health educators and community advocates. Undergraduate students at the International Islamic University Malaysia Kuantan Campus, Pahang, Malaysia are strategically relevant due to the concentration of academic programmes in Medicine, Pharmacy, Allied Health Sciences, Nursing and Science. Assessing their

knowledge, attitudes and preparedness yields empirical data to guide health science curriculum development, refine risk communication training and enhance institutional outbreak preparedness planning. Therefore, this study aimed to determine the levels of knowledge, attitude and preparedness towards Nipah virus among undergraduate students at IIUM Kuantan Campus and to examine their association with selected sociodemographic factors.

METHODS

Study Design, Setting and Participants

A quantitative cross-sectional study was conducted among undergraduate students at IIUM Kuantan Campus, Pahang, Malaysia. The study involved students from six Kulliyahs: Nursing, Medicine, Dentistry, Pharmacy, Science and Allied Health Sciences. Convenience sampling was used to recruit participants who were available and willing to participate. The minimum sample size was calculated using the Raosoft sample size calculator based on a 5% margin of error, 95% confidence level, 50% response distribution and an estimated population of 3,840 undergraduate students. After considering a 10% dropout rate, the required sample size was 385; a total of 391 students were ultimately recruited.

The inclusion criteria were undergraduate students currently enrolled at IIUM Kuantan, able to answer the questionnaire in English and willing to participate. Postgraduate students and students who were unable to answer the questionnaire in English were excluded.

Instrument and Scoring

Data were collected using a structured self-administered questionnaire adapted and modified from Himes et al. (6). A pilot study involving 38 respondents was conducted to assess clarity and reliability, yielding a Cronbach alpha value of 0.765. The final questionnaire contained four sections: sociodemographic data, knowledge, attitude and preparedness towards NVI.

The knowledge section included 19 statements on clinical presentation, transmission, risk factors and prevention of NVI, with responses recorded as true, false or do not know. Correct answers were scored as 1, while

incorrect and do not know responses were scored as 0.

Knowledge was categorised as good (13 to 19), moderate (7 to 12) or poor (0 to 6). The attitude section included seven items rated on a five-point Likert scale, with total scores categorised as good (23 to 35), moderate (12 to 22) or poor (7 to 0). The preparedness section included four Likert scale items, with total scores categorised as good (13 to 20), moderate (7 to 12) or poor (4 to 0).

Ethical Consideration

Ethical approval was obtained from the Kulliyyah of Nursing Postgraduate and Research Committee (KNPGRC), International Islamic University Malaysia (IIUM) Kuantan, Pahang and the IIUM Research Ethics Committee (IREC ID: 2024-068) before data collection. Participants were provided with an information sheet and gave informed consent prior to participation. Participation was voluntary, responses were anonymous and confidential, and participants were allowed to withdraw at any time without penalty.

Statistical Analysis

Data were analysed using IBM Statistical Package for the Social Sciences (SPSS) Version 27. Frequencies and percentages were used to summarize descriptive data. Pearson Chi square test was used to examine associations between sociodemographic factors and levels of knowledge, attitude and preparedness. Expected cell counts were checked to ensure test assumptions were met. When expected cell counts were less than 5, Fisher exact test was applied. A *p*-value of less than 0.05 was considered statistically significant.

RESULT

Sociodemographic Characteristics

A total of 391 undergraduate students participated in the study. Most respondents were female (67.0%). The largest proportion of respondents were from the Kulliyyah of Nursing (28.6%), followed by Dentistry (18.4%) and Medicine (17.6%). Fourth-year students formed the largest group (35.0%).

Levels of Knowledge, Attitude and Preparedness Towards Nipah Virus Infection

Overall, among the 389 respondents with complete knowledge data, 40.4% demonstrated good knowledge, 36.5% had moderate knowledge and 23.1% had poor knowledge. Two respondents were excluded from the knowledge level analysis because of incomplete responses. In contrast, all 391 respondents were included in the attitude and preparedness analyses, of whom 77.5% demonstrated good attitude and 76.0% demonstrated good preparedness towards NVI.

Knowledge Towards Nipah Virus Infection

Most respondents correctly identified NiV as a zoonotic infection (70.3%) and fruit bats as the main reservoir (63.2%). However, important misconceptions were observed. More than half of respondents answered that a vaccine is currently available (55.8%) and that NiV can be cured with antibiotics (55.2%), although these statements are inaccurate. A total of 32.2% believed NiV could be spread through mosquitoes, and 35.5% believed it could be transmitted through sexual intercourse.

Attitude and Preparedness Towards NVI

Most respondents agreed or strongly agreed that NiV is a serious disease (68.6%), that patients with NVI should not be stigmatised or discriminated against (74.2%), and that medical consultation is necessary if influenza-like symptoms occur during an outbreak (75.9%). Preparedness was also generally positive: 68.8% felt prepared to communicate NiV risk within their circles, 75.0% agreed on the need to work with health authorities, and 71.6% felt prepared to practise precautions during an outbreak. However, 21.0% were unsure whether their institution was prepared to respond to an outbreak.

Association between Sociodemographic Factors and Knowledge, Attitude and Preparedness

Kulliyyah was significantly associated with knowledge level ($p = 0.021$), attitude level ($p = 0.022$) and preparedness level ($p = 0.028$). Gender was significantly associated with attitude level ($p = 0.008$), but not with knowledge ($p = 0.257$) or preparedness ($p = 0.135$). Year of study was not significantly associated with knowledge, attitude or preparedness levels.

Table 1: Sociodemographic characteristics of respondents (N = 391)

Variables	Frequency (f)	Percentage (%)
Gender		
Male	129	33.0
Female	262	67.0
Kulliyyah		
Nursing	112	28.6
Medicine	69	17.6
Dentistry	72	18.4
Pharmacy	55	14.1
Science	44	11.3
Allied Health Sciences	39	10.0
Year of Study		
Year 1	55	14.1
Year 2	81	20.7
Year 3	97	24.8
Year 4	137	35.0
Year 5	21	5.4

Table 2: Levels of Knowledge, Attitude and Preparedness Towards Nipah Virus Infection
(Knowledge: N = 389; Attitude and Preparedness: N = 391)

Variables	Frequency (f)	Percentage (%)
Knowledge Level		
Good	157	40.4
Moderate	142	36.5
Poor	90	23.1
Attitude Level		
Good	303	77.5
Moderate	74	18.9
Poor	14	3.6
Preparedness Level		
Good	297	76.0
Moderate	77	19.7
Poor	17	4.3

Table 3: Knowledge Towards Nipah Virus Infection (N = 391)

Statement	True, f (%)	False/Do not know, f (%)
Nipah virus is a zoonotic infection caused by a Henipavirus of the family Paramyxoviridae.	275 (70.3)	116 (29.7)
A vaccine is currently available to prevent Nipah virus disease.	218 (55.8)	173 (44.2)
Fruit bats are the main reservoir of the Nipah virus.	247 (63.2)	144 (36.8)
The Nipah virus can be transmitted from human to human via droplet infection.	238 (60.9)	153 (39.1)
Currently, there is no known treatment for the Nipah virus.	201 (51.4)	190 (48.6)
There are many strains of the Nipah virus.	217 (55.5)	174 (44.5)
Outbreaks of NiV occur most often during dry season between April and October.	208 (53.2)	183 (46.8)
The Nipah virus was first discovered in 1998 in Malaysia in Kampung Sungai Nipah.	212 (54.2)	179 (45.8)

The Nipah virus can be spread through mosquitoes.	126 (32.2)	265 (67.8)
Drinking infected date palm sap is a common risk factor for human Nipah virus infection.	231 (59.1)	160 (40.9)
Human-to-human transmission of the Nipah virus has been reported in Malaysia and India.	239 (61.1)	152 (38.9)
The Nipah virus does not cause disease in animals.	169 (43.2)	222 (56.8)
The 2018 Nipah outbreak in Kerala had a high mortality rate.	188 (48.1)	203 (51.9)
The Nipah virus can cause HIV/AIDS.	86 (22.0)	305 (78.0)
Symptoms of Nipah virus infection may include acute respiratory distress, convulsions and coma.	237 (60.6)	154 (39.4)
Nipah virus infection can be asymptomatic.	236 (60.4)	155 (39.6)
The Nipah virus can be passed on during sexual intercourse.	139 (35.5)	252 (64.5)
The Nipah virus can be cured with antibiotics.	216 (55.2)	175 (44.8)
Supportive care is the primary treatment for Nipah virus.	255 (65.2)	136 (34.8)

Table 4: Attitude Towards Nipah Virus Infection (N = 391)

Statement	Strongly disagreed, f (%)	Disagreed, f (%)	Not sure, f (%)	Agreed, f (%)	Strongly agreed, f (%)
The Nipah virus is a serious disease.	27 (6.9)	28 (7.2)	68 (17.4)	89 (22.8)	179 (45.8)
I can help prevent the spread of the Nipah virus by sharing awareness with others.	15 (3.8)	32 (8.2)	59 (15.1)	95 (24.3)	190 (48.6)
The Nipah virus poses a serious public health threat in my country.	23 (5.9)	30 (7.7)	74 (18.9)	89 (22.8)	175 (44.8)
If someone in my family were to get Nipah, I would want it to remain private and secret.	123 (31.5)	82 (21.0)	67 (17.1)	66 (16.9)	53 (13.6)
Patients with Nipah virus infection should not be stigmatised and discriminated against.	24 (6.1)	28 (7.2)	49 (12.5)	96 (24.6)	194 (49.6)
The government and media provide trustworthy information about Nipah virus.	26 (6.6)	27 (6.9)	59 (15.1)	97 (24.8)	182 (46.5)
I need to see a doctor if I have influenza-like symptoms during a Nipah virus outbreak.	21 (5.4)	25 (6.4)	48 (12.3)	92 (23.5)	205 (52.4)

Table 5: Preparedness Towards Nipah Virus Infection (N = 391)

Statement	Strongly disagreed, f (%)	Disagreed, f (%)	Not sure, f (%)	Agreed, f (%)	Strongly agreed, f (%)
I feel prepared to communicate the risk of acquiring the Nipah virus with my circles.	29 (7.4)	28 (7.2)	65 (16.6)	73 (18.7)	196 (50.1)
I have to work with health authorities in the prevention and control activities of Nipah virus infection.	13 (3.3)	39 (10.0)	46 (11.8)	89 (22.8)	204 (52.2)
I feel prepared to practise precautions if there is a Nipah virus outbreak.	20 (5.1)	38 (9.7)	53 (13.6)	92 (23.5)	188 (48.1)
My institution is prepared to respond to an outbreak of the Nipah virus.	18 (4.6)	34 (8.7)	82 (21.0)	81 (20.7)	176 (45.0)

Table 6: Association Between Sociodemographic Factors and Levels of Knowledge, Attitude and Preparedness Towards Nipah Virus Infection (N = 391)

Variables	Knowledge level (p-value)	Attitude level (p-value)	Preparedness level (p-value)
Gender	0.257	0.008*	0.135
Kulliyah	0.021*	0.022*	0.028*
Year of study	0.557	0.081	0.679

*p-value < 0.05

DISCUSSION

This study revealed that only 40.4% of undergraduate health science students at IIUM Kuantan possessed good knowledge regarding Nipah virus infection, leaving nearly 60% of respondents with moderate or poor knowledge levels. Rather than reflecting strong baseline awareness, a finding where fewer than half of health science The finding that fewer than half of the health science undergraduates demonstrated good knowledge suggests insufficient baseline awareness, reflecting a significant curricular gap and a potential limitation in institutional outbreak preparedness. While these students will directly transition into roles as clinical personnel, health educators and community advocates, this knowledge gap is particularly concerning. This knowledge level is lower than findings reported among healthcare cohorts in South India by Himes et al. [6], where proximity to recurring outbreaks contributed to higher baseline clinical awareness. Furthermore, the observed knowledge gaps mirror community findings on bat borne pathogens in Malaysia by Mohamed et al. (7), demonstrating that limited

understanding of zoonotic transmission persists across both public and academic settings due to the absence of domestic outbreaks since 1999.

The clinical importance of this knowledge deficit is further highlighted by widespread misconceptions regarding treatment and prevention. More than half of the respondents incorrectly believed that a vaccine is currently available and that Nipah virus infection can be cured with antibiotics. These misconceptions are clinically critical because management remains primarily supportive, with no licensed vaccine or curative antiviral treatment available for routine use [10]. Believing that effective pharmaceutical cures or vaccines exist may reduce risk perception, impair clinical recognition during an emergency and delay appropriate health seeking behavior.

The generally positive attitude observed in this study is encouraging. Most respondents recognised NiV as a serious disease and supported non-stigmatising attitudes towards infected patients. This is important because stigma and secrecy during outbreaks can delay

reporting, contact tracing and early clinical management. The significant association between gender and attitude suggests that female respondents were more likely to report positive attitudes towards NVI, a pattern that may reflect greater engagement with health-related information or preventive practices. However, educational strategies should target all students to ensure balanced awareness and readiness across gender groups.

Preparedness was generally positive, with most respondents reporting that they were prepared to communicate the risks of Nipah virus infection, collaborate with health authorities and practise appropriate precautions during an outbreak. However, these findings reflect self-perceived preparedness rather than objectively assessed outbreak response competence. Feeling prepared to communicate risk or practise preventive measures does not necessarily indicate that students possess adequate knowledge or practical skills related to reporting procedures, appropriate personal protective equipment (PPE) use, isolation measures or institutional outbreak response protocols. Therefore, the relatively high preparedness scores should be interpreted with caution.

The findings should also be considered within the Malaysian context. Although Nipah virus was first identified in Malaysia during the 1998–1999 outbreak, no subsequent human outbreaks have been reported in the country, and the East Coast of Peninsular Malaysia, including Kuantan, has not experienced a documented Nipah virus outbreak. Consequently, many respondents are unlikely to have had direct exposure to outbreak response activities, institutional preparedness exercises or public health campaigns specifically related to Nipah virus. This may partially explain why preparedness was largely based on personal perception rather than practical experience.

Preparedness level was also significantly associated with Kulliyyah, indicating that preparedness differed across academic disciplines. This association may reflect variations in curricular exposure to infectious disease prevention, public health and outbreak management. Students enrolled in programmes with greater emphasis on clinical practice and infection prevention may have had more opportunities to develop confidence in responding to emerging infectious diseases.

Although the present study did not examine preparedness across individual Kulliyyahs in detail, the findings suggest that institution-wide educational initiatives and outbreak preparedness training should be implemented to ensure consistent preparedness among students regardless of their academic background.

Overall, the findings highlight the importance of strengthening education on zoonotic diseases and outbreak preparedness among undergraduate students. Targeted educational interventions should focus on addressing misconceptions regarding vaccine availability, antibiotic treatment and transmission routes, while enhancing awareness of institutional outbreak preparedness, infection control measures and effective risk communication.

CONCLUSION

Respondents demonstrated generally positive attitudes and preparedness towards Nipah virus infection, whereas knowledge was more variable, with fewer than half demonstrating good knowledge. Important misconceptions persisted, particularly regarding vaccine availability, antibiotic treatment and transmission routes. Kulliyyah was significantly associated with knowledge, attitude and preparedness, while gender was significantly associated with attitude. These findings highlight the need for targeted educational interventions, institutional outbreak preparedness briefings and collaborative awareness programmes across Kulliyyahs to improve knowledge, strengthen practical preparedness and support future responses to emerging zoonotic disease threats.

LIMITATIONS

This study was conducted at a single university campus and used convenience sampling therefore, the findings may not be generalisable to all Malaysian university students. The unequal distribution of respondents across Kulliyyahs and years of study may also influence the representativeness of the findings. Data were collected using self-reported questionnaires, which may be affected by response bias and misunderstanding of some items. Future studies should include multiple universities, employ stratified random sampling and consider mixed method approaches to explore

reasons behind misconceptions and preparedness gaps.

CONFLICT OF INTEREST

The authors declare no conflict of interest regarding this work.

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AUTHOR CONTRIBUTIONS

NAA: Conceptualization, methodology, data collection, data interpretation and original draft writing.

AA: Conceptualization, methodology and critical review.

MHF: Conceptualization, methodology and critical review.

NZA: Conceptualization, methodology and critical review.

WNI: Critical review.

NO: Conceptualization, methodology, supervision, data interpretation, manuscript writing, critical review, editing and overall project supervision.

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