

Effects of Educational Intervention Regarding Nipah Virus Infection among Bachelor Level Nursing Students

Aayoushma Shrestha¹, Maiya Ranjitkar²

Abstract: Introduction: Nipah virus (NiV) infection is a zoonotic disease. The natural host of Nipah virus are fruit bats of Pteropodidae family. Case fatality of NiV infection ranges from 40-75%. There are currently no vaccines approved for human use. Thus, it is necessary to raise their knowledge level regarding NiV infection. Objectives: To assess the knowledge regarding Nipah virus infection among the nursing students before and after educational intervention. Methodology: Pre-experimental one group pre-test post-test design was used among 54 nursing students from Om Health Campus. Self administered questionnaire consisting demographic characteristics and knowledge regarding NiV infection was used before and after educational intervention. Results: The mean of pre-test knowledge was 7.40 whereas, the mean of post-test was 13.72 with a difference of 6.32. The paired t- value was 8.13 ($p=0.00$) showing the significant increase in the knowledge level regarding NiV infection after an educational intervention. Conclusion: Results of this study indicated most of the respondents had inadequate knowledge before educational intervention and all the respondents had adequate knowledge after educational intervention. Thus, the study concluded that in order to upgrade the knowledge of nursing students on emerging diseases education intervention will be beneficial.

Keywords: Educational intervention, Nipah Virus Infection, Knowledge, Bachelor level nursing students

1. Introduction

Background

Nipah virus (NiV) is a type of RNA virus, a member of the family Paramyxoviridae, genus Henipavirus and is related to Hendra virus that infects horses. It is a zoonotic virus which requires direct contact with an infected source for the spread. The natural host of the virus are fruit bats of the Pteropodidae Family. The incubation period of NiV infection varies from five to 14 days. (1) The fatality rate estimated by World Health Organization (WHO) ranges from 40-75%. However, WHO highlights that this rate may vary depending on surveillance capacities involved in the outbreak. (2) WHO added NiV infection to its list of "priority diseases" earlier this year, along with more well-known conditions like Ebola, Zika, and SARS. (3) Within 24 hours of infection, the virus affects the central nervous system and the patient might develop coma, within 48 hours the patient may die or if survived will have a massive neurological disorder. (4) NiV infection in humans has a range of clinical presentations, from asymptomatic infection to acute respiratory syndrome and fatal encephalitis. NiV is also capable of causing disease in pigs and other domestic animals. There is no vaccine for either humans or animals. The primary treatment for human cases is intensive supportive care. (5)

NiV Infection was initially identified in 1999. It's name originated from Sungai Nipah, a village in the Malaysian Peninsula where pig farmers became ill with encephalitis. NiV infection caused death of large numbers of human (nearly 300 human cases with over 100 deaths were reported). In order to stop the outbreak, more than a million pigs were euthanized. Since this outbreak, no subsequent cases (in neither swine nor human) have been reported in either Malaysia or Singapore. (6)

In Bangladesh, NiV was first identified as the cause of an outbreak of encephalitis in 2001. Since then, 11 NiV outbreaks have been identified repeatedly in Bangladesh, involving 20 districts, all occurring between December and May. Respiratory involvement including pneumonia has been found to be considerably more among patients in Bangladesh than Malaysia. This may be due to genetic diversity of the viral strains. The prominent respiratory involvement probably is responsible for human to human transmission. (7)

India has reported 3 outbreaks of NiV infection till now. It was first seen in 2001, then in 2007 (8) and now in 2018. In 2018, 18 cases with 16 deaths were reported. (9) India reported two outbreaks of Nipah virus encephalitis in 2001 and 2007. In second outbreak a horde of bats were observed hanging from trees around a patient's residence which suggests direct contact with bat fluids. (10) Adequate awareness on NiV infection was being created through local TV channels, whatsapp and other mode of communication. A rapid response team was formed to attend to any case as soon as it is brought to the notice of the health authorities. (11)

NiV infection is considered as a deadly disease. Recently, it was seen in India. Though there is no history of NiV infection in Nepal, the open borders between Nepal and India might create a chance of getting NiV infection in Nepal during Nipah season. The bats (Pteropus spp.) that have been causing NiV infection is also present in Kathmandu and Chitwan district of Nepal. (12) NiV infection had caused death of 16 people in India this year including a nurse in India. (9) Therefore, it is necessary to provide adequate information about the NiV infection to the nursing students and assess their knowledge on NiV infection which might be very useful for them in preventing possible NiV infection in home and clinical environment. Through this means, they can remain

safe and can create an environment where other people can stay safe.

2. Literature Survey

Previous studies showed different facts and opinions regarding NiV infection. During the emergence of Nipah in Malaysia, an outbreak of severe febrile encephalitis in humans and encephalitis and respiratory diseases in pigs were observed. The outbreak subsequently spread to various regions of the country due to the movement of infected pigs. Fruit bats of Pteropid species were identified as the natural reservoir hosts. Evidence suggested that climatic and anthropogenic driven ecological changes coupled with the location of piggeries in orchard and the design of pigsties allowed the spill-over of this novel paramyxovirus from its reservoir host into the domestic pigs and ultimately to humans and other animals. (13) And a case-control study was conducted in Bangladesh to identify risk factors for transmission during December 2010 to March 2011, showed drinking raw date palm sap and contact with an infected person were major risk factors (transmission can apparently occurred through contact with corpse). In absence of these risk factors, apparent routes of transmission included drinking fermented date palm sap. (14)

In a study the researchers describe the vaccine potential of NiV virus-like particles (NiV VLPs) composed of three NiV proteins G, F and M. The VLPs intracellular processing also appeared similar to NiV virions. The size, morphology and surface composition of the VLPs were consistent with the parental virus, and importantly, they retained their antigenic potential. These particles, formulated without adjuvant, were able to induce neutralizing antibody response in Balb/c mice. These findings indicate vaccine potential of these particles and will be the basis for undertaking future protective efficacy studies in animal models of NiV disease. (15) Similarly, an initial pilot study was performed at the Rocky Mountain Laboratories (RML) to assess the potential protective efficacy of m102.4 against NiV in African green monkeys (AGMs) which showed the successful therapeutic in-vivo efficacy of m102.4 against NiV in a nonhuman primate (but currently there are no approved vaccines or treatments for human use against NiV) and highlight the potential impact of monoclonal antibody on a highly pathogenic zoonotic human disease. (16) In order to investigate pathogenic differences between strains, 4 African green monkeys (AGM) were exposed to NiV Malaysia (NiV_M) and 4 AGMs were exposed to NiV Bangladesh (NiV_B), which showed that NiV_B is more pathogenic in AGMs under identical experimental conditions and suggests that post exposure treatments may need to be NiV strain specific for optimal efficacy. (17) During August 2005 and May 2006, the researcher performed neurologic evaluations and brain magnetic resonance imaging (MRI) on 22 previously identified NiV infection survivors. Which showed, persistent fatigue and functional impairment was frequent. Neurologic sequelae were frequent following Nipah encephalitis. Neurologic dysfunction may persist for years after acute infection, and new neurologic dysfunction may develop after acute illness. Survivors of NiV infection may

experience substantial long-term neurologic and functional morbidity. (18)

A study was conducted in November-December 2012 from randomly selected villages from Rajbari and Kushtia Districts in Bangladesh. Among 1,777 respondents few respondents (5%) had heard about NiV which indicate low knowledge on NiV and were likely to drink sap when it was available. Implementing strategies to increase awareness about the risks of NiV and protect sap from bats might reduce the risk of NiV transmission. (19) An effective way to prevent transmission from raw date palm sap is by using bamboo skirts as it interrupts bat access to the sap. Low-cost behavior change intervention is effective to prevent the NiV infection. (20)

A sero-prevalence study and exposure survey of healthcare workers was conducted to assess the risk of nosocomial transmission of Nipah virus during an outbreak in Bangladesh in 2004. No evidence of recent Nipah virus infection was detected despite substantial exposures and minimal use of personal protective equipment. (21) Similarly, a descriptive cross sectional study was carried out in pigs of Kathmandu and Chitwan districts where bats of the genus *Pteropus* sps (fruit bats) are also present. Blood samples of pigs from ear vein were collected. Out of 120 pig sera, only 3 sera samples were found doubtful to Hendra virus and Nipah virus by Luminex binding assay. (12)

1) Research Hypothesis

H₀= There will not be significant increase in respondent's level of knowledge regarding Nipah virus infection after educational intervention.

H₁= There will be significant increase in respondent's level of knowledge regarding Nipah virus infection after educational intervention.

2) Study Variables

Dependent Variable: Knowledge regarding Nipah virus infection.

Independent Variables

- Age
- Occupation
- Working experience
- Educational intervention

3. Methodology

The study was conducted in Om Health Campus, Gopikrishna nagar, Kathmandu, one of the nursing college in capital city of Kathmandu. Pre-experimental one group pre-test post-test design was used. The sample was Bachelor of Science in Nursing (BSN) 1st year and Post Basic Bachelor in Nursing (PBBN) 1st year nursing students. Census technique was followed. Self administered questionnaire was provided to assess the knowledge regarding Nipah virus infection among 54 nursing students. Same questionnaire was provided to

assess the knowledge before and after educational intervention

After obtaining informed consent from all the participants , they were asked to fill the questionnaire within 15 minutes. Each respondent's knowledge was analyzed as adequate if obtained marks was above 50%.

The collected data was checked, reviewed and organized for accuracy and completeness. The mode of data entry was computerized. Collected data was coded and entered and statistical analysis was performed using SPSS (version 21) software.

4. Result

Table 1: Respondent's Demographic Information, n = 54

Variable	Frequency	Percent
Age		
17 -23	34	62.96
24-34	20	37.04
(Mean age : 22, Standard deviation =3.76)		
Gender		
Female	54	100
Male	0	0
Temporary address		
Within Kathmandu	50	92.60
Outside Kathmandu	4	7.40
Permanent address		
Within Kathmandu	16	29.63
Outside Kathmandu	38	70.37
Faculty		
BSN 1 st Year	28	51.9
PBBN 1 st Year	26	48.1

Table 1 shows, majority of respondents (62.96%) belonged to 17-23 age group. The mean age of the respondents was 22 with standard deviation 3.76. All of the respondents were female. The temporary address of most of the respondents (92.6%) was Kathmandu. Most (51.9%) of the respondents were studying BSN 1st year and 48.1% of them were studying PBBN 1st year.

Table 2: Occupational History, n = 54

Variable	Frequency (f)	Percent (%)
Currently working in the hospital		
Working	12	22.2
Not working	42	77.8
Experiences in years n=12		
2 -4	8	66.67
5- 8	4	33.33
Current working unit n=12		
Special ward	6	50
General ward	6	50

Table 2 reveals, 22.2% of the respondents (PBBN) were working in the hospital. The majority of the respondents who were working in the hospital (66.67%), had working experience of 2-4 years. Half of the respondents who were

working in the hospital were working in the special wards and rest of them were working in the general ward.

Table 3: Respondent's Level of Knowledge, n= 54

Knowledge	Pre-test f (%)	Post-test f (%)
Adequate	24 (44.4)	54 (100)
Inadequate	30 (55.6)	0

Table 3 signifies the respondent's level of knowledge on NiV infection. Among all the respondents 44.4% had adequate knowledge whereas, 55.6% had inadequate knowledge in pre-test. Hereby, after educational intervention all of the respondents had adequate knowledge regarding NiV infection.

Table 4: Comparison between Pre-test and Post-test on Knowledge regarding Nipah virus Infection, n= 54

Variable	Pre-test (X±SD)	Post-test (X±SD)	Paired t-test
Knowledge	7.40(2.25)	13.72(2.24)	-8.13 (p=0.00)

P ≤ 0.05

Table 4 shows the comparison between pre-test and post-test on knowledge regarding NiV infection . The mean and standard deviation on pre-test was 7.40 and 2.25 whereas, after educational intervention it was 13.72 and 2.24 respectively, thus showing effectiveness of educational intervention . Hereby, the calculated t-value (t_{cal}) was -8.13 , and tabulated t-value (t_{tab}) was 1.674 with the significance of 0.00 at 95% confidence level thus H_1 hypothesis is accepted. This shows that an educational intervention is effective in upgrading the knowledge among nursing students.

5. Discussion

An education intervention study on Nipah virus infection among nursing students were not available so other education intervention studies with similar results were discussed.

This study showed there was significant change in knowledge of nursing students after educational intervention .This study findings are similar to a cross sectional observational study conducted by Shrestha (Rai) I. in August 2008. The findings revealed that there was significant difference in the pre and post-intervention test knowledge. (22)

This study showed 44.4% had adequate knowledge in pre-test. Whereas, in post-test 100% of the respondents had adequate knowledge which indicates an educational program can increase the knowledge of nursing students .Likewise, a quasi-experimental study conducted by Abd El-Mohsen A.S.and Abd El-Maksoud M.M. in Cairo showed few (10.6%) of students had satisfactory level of knowledge in pre-program, while the majority of them (78.8%) had a satisfactory level of knowledge about BSE at post program which indicates the increment of knowledge after educational intervention. (23)

6. Conclusion

Results of this study indicated most of the respondents had inadequate knowledge before educational intervention and all

the respondents had adequate knowledge after educational intervention. Thus, the study concluded that in order to upgrade the knowledge of nursing students on emerging diseases education intervention will be beneficial.

7. Recommendation

- Knowledge regarding emerging diseases should be provided to the nursing students and nurses periodically.
- Mass awareness on Nipah virus infection is required throughout the world.
- Further research studies are needed to be conducted regarding Nipah Virus Infection among various groups using large sample.

References

- [1] Davis PC. Nipah Virus Infection. MedicineNet.com. 2018 May 25.
- [2] Colleen N. Nipah in Bangladesh. The Disease Daily. 2015 April 12.
- [3] Miller K. Nipah is rare, but infectious disease experts are keeping an eye on it. 2018 May 29.
- [4] Aster MIMS. Nipah Virus - The Facts You Need to Know. 2018 May 24.
- [5] WHO. Nipah virus infection. Emergencies preparedness, response. .
- [6] Centers of Disease Control and Prevention. Nipah Virus (NiV). 2018 May 30.
- [7] Rahman PM, Husain DMM. National Guideline for Management, Prevention and Control of Nipah Virus Infection including Encephalitis. 2011 December.
- [8] Kulkarni DD, Tosh C, Venkatesh G, Kumar DS. Nipah virus infection: current scenario. PMC. 2013 November 7.
- [9] Gupta S, Thakur A. Nipah death toll rises to 16, but end of outbreaking might be near. CNN. 2018 July 4.
- [10] Money control. Nipah virus: Third outbreak in India, here's why deadly virus has re-emerged. 2018 May 28.
- [11] Financial Express. Outbreak of Nipah virus in Kerala's Kozhikode: All precautionary steps taken in Pudukkottai, says CM V Narayanasamy. 2018 May 22.
- [12] Prajapati M, Shrestha P, Shrestha SP, Khanal DR, Breed A, Wise E, et al. Screening for Nipah Virus Infections in Pigs of Kathmandu Valley and Chitwan District of Nepal.
- [13] Chua KB. Nipah virus outbreak in Malaysia. Journal of Clinical Virology. 2003 April; 26(3): p. 265-275.
- [14] A. C, Sazzad HMS, Hossain MJ, Islam MS, Parveen S, Husain M, et al. Evolving epidemiology of Nipah virus infection in Bangladesh: evidence from outbreaks during 2010–2011. PMC. 2017 January 1.
- [15] Walpita P, Barr J, Sherman M, Basler CF, Wang L. Vaccine Potential of Nipah Virus-Like Particles. PLOS ONE. 2011 April 6.
- [16] Geisbert TW, Mire CE, Geisbert JB, Chan YP, Agans KN, Feldmann F, et al. Therapeutic Treatment of Nipah Virus Infection in Nonhuman Primates with a Neutralizing Human Monoclonal Antibody. PMC. 2015 June 15.
- [17] Mire CE, Satterfield BA, Geisbert JB, Agans KN, Borisevich V, Yan L, et al. Pathogenic Differences between Nipah Virus Bangladesh and Malaysia Strains in Primates: Implications for Antibody Therapy. PMC. 2016 August 3.
- [18] Sejvar J, Hossain J, Saha S, Gurley E, Banu S, Hamadani J, et al. Long-term neurological and functional outcome in Nipah virus infection. PubMed. 2007 September.
- [19] Nahar N, Paul RC, Sultana R, Gurley ES, Garcia F, Abedin J, et al. Raw Sap Consumption Habits and Its Association with Knowledge of Nipah Virus in Two Endemic Districts in Bangladesh. PLOS ONE. 2015 November 9.
- [20] Nahar N, Mondal UK, Hossain MJ, Khan MSU, Sultana R, Gurley ES, et al. Piloting the promotion of bamboo skirt barriers to prevent Nipah virus transmission through date palm sap in Bangladesh. PMC. 2014 April 22.
- [21] Gurley ES, Montgomery JM, Hossain MJ, Islam MR, Molla MAR, Shamsuzzaman SM, et al. Risk of Nosocomial Transmission of Nipah Virus in a Bangladesh Hospital. Research Gate. 2007 June; 28.
- [22] Shrestha (Rai) I. Impact of Educational Intervention on Knowledge and Practice of Universal Precautions among Nurses. Journal of Patan Academy of Health Sciences. 2014; 1.
- [23] Abd El-Mohsen AS, Abd El-Maksoud MM. Improve Knowledge, Beliefs and Behavior of Undergraduate Female Nursing Students in Al-Alzhar University toward Breast Self-Examination Practice. Journal of Education and Practice. 2015; 6.