INTRODUCTION

Nipah virus (NiV) is a recently emergent deadly zoonotic virus, which belongs to the family paramyxoviridae. This virus was implicated as the cause of highly fatal, febrile encephalitis in Malaysia and Singapore in 1999 and in Bangladesh in 2001, 2003 and 2004.1 NiV was first recognised in 1999 during an outbreak among pig farmers in Malaysia and Singapore which presented with encephalitis symptoms. This outbreak alerted the global public health community to the severe pathogenic potential of this unique virus.2 The virus is named after the Malaysian village where it was first discovered. The knowledge about Nipah virus was limited to Malaysia, Singapore and Bangladesh, until the recent and first outbreak in Kerala in 2018 followed by another very recent outbreak in 2019.1

Fruit bats belonging to the family Pteropodidae and pigs are the natural host for Nipah virus. Clinical features
varies from fever with acute respiratory distress to fatal encephalitis. Clinical symptoms commonly seen were fever, headache, dizziness and vomiting. The spread of the virus is very rapid and fatal, with a case fatality of 40-70%.

The transmission of NiV virus occurs from infected pigs to human (Malaysian NiV outbreak), infected bats to human (consumption of raw date palm sap contaminated with infectious bat excretions) and also human to human transmission (seen in the family and caregivers of NiPah virus infected person). There is no proven effective treatment at present and primary treatment is intensive supportive care.

As the deadly Nipah virus, resurfaces in Kerala in 2018, Karmataka being nearby state is put on high alert, among which Mysore is one such district. So with this background, the study intended to assess the knowledge and attitude about Nipah virus infection among the medical students of JSS Medical College, Mysuru district, as learning about public health makes them better doctors.

**METHODS**

The study was conducted among 4th term and 8th term MBBS students of JSS Medical College, Mysuru, Karmataka. The 4th term and 8th term students were selected to find out if there is any difference in the knowledge and attitude on Nipah virus infection based on clinical exposure. Since medical students are tomorrow’s doctors, they should have a good insight about the effect of a disease not only at individual level but in a community. The study sample of 271 was obtained by convenient sampling method. Students who were willing to participate were included and those who were absent for the class and not willing to participate in the study were excluded. An ethical clearance was obtained from institutional ethical committee prior to the study. An informed consent was taken from the study participants before the process of data collection. The study was done over a period of 3 months (April 2019-June 2019). Data regarding knowledge and attitude was collected using pretested semi-structured questionnaire. Data was analysed using SPSS-24. Descriptive statistics like percentage, mean and standard deviation were applied. Inferential statistical tests like chi-square test were applied for association. P value <0.05 was considered statistically significant.

**RESULTS**

Among the 271 students, most of them were in the age group of 21±1.2 years. Female students constituted 68.3% whereas male students constituted 31.7% (Figure 1). All the students have heard about the disease Nipah. Majority of the students were from 8th term and constituted 51.3% (Figure 2). Major source of information for the study participants was from social media (35.4%) followed by newspaper (28.4%) (Figure 3).

Most of the students were aware about the clinical features, diagnosis, treatment and complications of Nipah virus infection. 27.7% of the students knew that Dr. Kaw Bing Chua discovered Nipah virus. 66.4% of the students were aware about the previous outbreak of Nipah virus and 97% were aware about the recent outbreak in Kerala.

**Figure 1: Distribution of study participants based on gender.**

**Figure 2: Distribution of study participants based on semester.**

**Figure 3: Source of information about Nipah.**

86% of the students were aware about the symptoms as fever, headache, nausea, vomiting and upper respiratory...
tract infection. 78.2% of the students were aware about the fatal complication (encephalitis). Only 58.7% were aware about the mode of spread as man-man, bat-man, pig-man. 71% were aware about the case fatality rate of Nipah virus (40-75%).

Regarding the diagnosis and treatment, 77.9% of the students were aware about the samples collected for lab diagnosis (throat swab, blood, urine, CSF). 69% of the students knew that NiV samples were tested in 3rd grade lab for confirmation (Table 1).

It was seen that 8th term students had good knowledge regarding the epidemiology of Nipah virus infection and it was statistically significant. Those students from previously affected native places (Kerala, Bangladesh) had good knowledge on Nipah virus when compared to residents from non-affected places, which was statistically significant. Females had good knowledge on Nipah virus infection when compared to males and it was found to be statistically significant (Table 2).

Table 1: Knowledge on the epidemiology of Nipah among medicos. (N=271).

| Knowledge on clinical features and complications | Aware N (%) | Not aware N (%) |
|--------------------------------------------------|-------------|----------------|
| Incubation period                                 | 85 (31.4)   | 186 (68.6)     |
| Symptoms                                          | 233 (86)    | 38 (14)        |
| Fatal complications                               | 212 (78.2)  | 59 (21.8)      |
| Case fatality rate                                | 195 (71)    | 76 (29)        |
| Infectivity rate                                  | 149 (55)    | 122 (45)       |
| Mode of spread                                    | 159 (58.7)  | 112 (41.3)     |

Knowledge about diagnosis and treatment

| Samples collected | 211 (77.9) | 60 (22.1) |
| Sample transportation | 187 (69) | 84 (31) |
| Confirmatory test | 80 (29.5) | 191 (70.5) |
| Treatment         | 178 (65.7) | 93 (34.3) |
| NiV lab grade     | 110 (40.6) | 161 (59.4) |

Table 2: Knowledge level of students on Nipah virus by selected variables (n=271).

| Categories        | Knowledge |           |           | P value |
|-------------------|-----------|-----------|-----------|---------|
|                   | Poor N (%)| Acceptable N (%)| Good N (%)|         |
| Term              |           |           |           |         |
| 4th               | 17 (12.9) | 74 (56.1) | 41 (31.1) | <0.05*  |
| 8th               | 7 (5.0)   | 54 (38.8) | 78 (56.1) |         |
| Native place      |           |           |           | <0.05*  |
| Affected          | 1 (1.1)   | 38 (42.7) | 50 (56.2) |         |
| Non affected      | 23 (12.6) | 90 (49.5) | 69 (37.9) |         |
| Socioeconomic status |         |           |           | <0.05*  |
| Upper class       | 17 (7)    | 117 (48.3)| 108 (44.6)|         |
| Upper middle      | 5 (21.7)  | 9 (39.1)  | 9 (39.1)  |         |
| Lower middle      | 2 (33.3)  | 2 (33.3)  | 2 (33.3)  |         |
| Gender            |           |           |           | <0.05*  |
| Male              | 13 (15.1) | 37 (43)   | 36 (41.9) |         |
| Females           | 11 (5.9)  | 91 (49.2) | 83 (44.9) |         |

*p value found to be significant.
Regarding the attitude level for Nipah virus infection, 8th term students had better attitude on Nipah virus infection prevention when compared to 4th term and it was statistically significant. Students from previously affected places had very good attitude on the preventive aspects of Nipah virus, which was statistically significant (Table 3).

**DISCUSSION**

It is well known that undergraduate years are the defining and evolutionary period for the learning of skills and knowledge. Infection control measures are needed to reduce the rate of infection and are to be taught in undergraduate (UG) years. A study conducted by Ayub et al in Armed Forces Medical College, Pune showed that only 77.5% of the UGs had complete knowledge regarding universal precautions and the finding was similar to the present study. The use of universal health precaution for all confirmed and suspected cases is a proactive measure that health professionals must follow and is more important to the primary care provider. A sound knowledge on the preventive aspects of the deadly disease can be a powerful tool in preventing future outbreaks of the disease in the community. Since there are no published Indian studies on the knowledge and attitude of Nipah virus disease among medical students in this part of Karnataka, India, the results obtained here can be regarded as a first step towards the provision of information, on knowledge and attitudes among medicos on Nipah infectious disease.

In the present study more than half of the students were aware about the clinical features and complications of Nipah virus infection which was similar to a study conducted by Kanniyan et al among medical students in a medical college of Kerala. A study done on the awareness regarding Ebola virus by Aliya et al, shows that about 63% of the students were aware about the mode of transmission, 50.6% of the students knew that Ebola virus disease can be diagnosed by ELISA. 53.2% of the students correctly identified that no treatment is available for Ebola virus disease as yet. In the present study 58.7% were aware about the mode of spread of Nipah virus infection and only 29.5% students were aware about the laboratory test for diagnosis of Nipah virus infection. Studies on Rabies awareness reveals that 74.3% of the medical students were aware about the common symptom of rabies in humans. Majority of the students (72.7%) were aware about immediate washing of the wound with soap and water. A similar cross sectional study regarding KAP of swine flu was conducted among medicos in Karachi by Hasan et al and it was found that majority of the students (80%) were aware about its transmissibility and they were able to enumerate preventive measures.

So these comparisons shows that medical students are more aware about other deadly infectious diseases as robust literature is available than Nipah virus. Awareness of the history will enable students to manage these situations that will occur during their working careers, and to learn from the past.

**CONCLUSION**

Majority of the students were aware about the Nipah virus infection and 97% were aware about the recent outbreak in Kerala. 86% of the students were aware about the symptoms of Nipah virus infection. 43.5% of the students had good knowledge regarding the epidemiology and treatment of Nipah virus infection and 47.20% had acceptable knowledge on Nipah virus. 33.60% of the students had good attitude regarding the preventive aspects of Nipah virus infection.

**Recommendations**

Medical students as doctors of tomorrow have vital role to play in this battle. Being future doctors, they need to have better knowledge on preventive and diagnostic aspects of infectious diseases to tackle such outbreaks in the future. CME’s and research projects on infectious diseases should be encouraged among medical students. Emerging and Re-emerging infectious diseases should be included in medical syllabus in detail.

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**Table 3: Attitude level of students on Nipah virus by selected variables (n=271).**

| Categories        | Attitude     | P value |
|-------------------|--------------|---------|
|                   | Poor (N (%)) | Acceptable (N (%)) | Good (N (%)) | Very good (N (%)) |
| **Term**          |              |              |              |                   |
| 4th               | 30 (22.7)    | 27 (20.5)    | 50 (37.9)    | 25 (18.9)         | <0.05*             |
| 8th               | 21 (15.1)    | 24 (17.3)    | 41 (29.5)    | 53 (38.1)         |                     |
| **Native place**  |              |              |              |                   |
| Affected          | 10 (11.2)    | 13 (14.6)    | 35 (39.3)    | 31 (34.8)         | <0.05*             |
| Non affected      | 41 (22.5)    | 38 (20.9)    | 56 (30.8)    | 47 (25.8)         |                     |
| **Gender**        |              |              |              |                   |
| Male              | 28 (32.6)    | 22 (25.6)    | 16 (18.6)    | 20 (23.3)         | <0.05*             |
| Female            | 23 (12.4)    | 29 (15.7)    | 75 (40.5)    | 58 (31.4)         |                     |

*p value found to be significant.*
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