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Knowledge, attitude, and practices on COVID-19 prevention among college students after an online health education program

Abstract

Objectives: This study explored if significant improvements in knowledge, attitude, and practices among college students will be observed after an online health education program on COVID-19 prevention.

Methods: The study reports a quantitative research work, particularly utilizing a pre-post study design on 178 college students. The participants received seven sessions of e-health education through Zoom video conferencing. The adapted and modified questionnaire was developed from previously published literature regarding viral epidemics related to MERS-CoV disease, infection prevention and control measures for COVID-19 by World Health Organization, and guidelines suggested by the CDC (Communicable Disease Control and Prevention). The first phase gathers the relevant profile and background of the participants, and the last phase comprises post-evaluation. The data were analyzed using SPSS v.27.

Results: The results indicate above-average means for knowledge on COVID-19 prevention in the pretest (17.75,±2.27) and in the posttest (17.60,±2.95). Moreover, the participants were aware of the importance of vaccination, social distancing measures, following health protocols, and the essentiality of compliance with government agencies guidelines. However, the participants were not practicing some of these health measures, as evidenced by the low means in the pretest (1.75, ±0.97) and posttest (1.66,±1.08). All tests for significant differences of pretest and posttest means of knowledge (p-value=0.46), attitude (p-value=0.12), and practices (p-value=0.41) on COVID-19 prevention were all insignificant.

Conclusion: Our study provided evidence that the online health education program improved college students' knowledge and attitude toward COVID-19 prevention, but they did not adhere to or practice some of the health measures to prevent its transmission.

Keywords: college students, COVID-19, health education, HECAT, prevention

Introduction

Coronavirus infection 2019 is an unique coronavirus disease caused by Coronavirus 2 and SARS (SARS-CoV-2). COVID-19 is a distinctive respiratory illness discovered in Wuhan, Hubei Province, China[1], in December of 2019. SARS-CoV-2 is a part of a larger family of ribonucleic acid (RNA) viruses that cause a wide range of illnesses, from the common colds to more severe diseases like Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV)[2]. Fever, dry cough, fatigue, myalgia, shortness of breath, and dyspnea[3] are the common symptoms of COVID-19.

COVID-19 is a highly pathogenic virus that is transmitted through close contact with an infected person[4]. The condition's characteristics are constantly developing. Moreover, COVID-19 has rapidly spread from Wuhan to other regions of the world, endangering the lives of a substantial number of people[5]. By the end of January 2020, the World Health Organization (WHO) declared a worldwide public health emergency and urged all nations to work together to stop the spread of the disease[6].

Following the WHO pronouncement, countries worldwide, including the Philippines, have started focusing on pandemic response strategies. Following confirmation of the country's first case of COVID-19, the Philippine government has kept a close eye on the issue and established country-specific measures to combat the outbreak following the World Health Organization and the Communicable Disease Control guidelines. These include suspending all inbound and outbound flights, closing all businesses and schools, except for pharmacies and food stores.

Regardless of the national measures used to control the outbreak, its success or failure is primarily based on public behavior [7–9]. To be more precise, universal compliance with preventive measures provided by the government is critical for preventing the development of the disease. Moreover, adherence to health protocols is influenced by public awareness and attitudes toward COVID-19[1]. More profound insights into current public perceptions and practices can be gained by assessing public awareness and knowledge about the virus, and identifying characteristics that influence the public's adoption of healthy practices and proactive behavior [10].

Dissemination of knowledge on disease prevention begins with educational institutions. Higher Education Institutions (HEIs) shifted from face-to-face to online learning modalities so that students can continue their studies despite the pandemic [11]. This shift prompted the HEIs to upgrade institutional planning and implement mitigating policies to contain and avoid the spread of the COVID-19 virus [12].

Furthermore, limited studies[7,8] were conducted on developing online health education programs to prevent COVID-19 infection among college students, thus furthering the need for evidence-based literature to support governmental policymakers. Health education programs may also increase individuals' knowledge of public health interventions, raise awareness, and improve health practices regarding the COVID-19 outbreak [1,13]. Additionally, it is critical to assess college students' knowledge, attitude, and practices in COVID-19 prevention to identify gaps and strengthen ongoing mitigation efforts by the Higher Education Institutions [7,14]. In this connection, this study explored if significant improvements in knowledge, attitude, and practices among college students will be observed after an online health education program on COVID-19 prevention.

Methods

Study Design

This study utilized a pretest-posttest design. Data on the participants' socio-demographic profile in terms of age, sex, and socio-economic level were gathered before the program started. Knowledge, attitude, and practices on COVID-19 prevention were collected before and after the health education program.

Participants, Inclusion, and Exclusion Criteria

The participants were college students enrolled in a state university and private college for the second semester of the academic year 2020 –2021. The stringent health and governmental protocols implemented by the Inter-Agency Task Force (IATF) during the study were one of the major challenges in selecting participant institutions. To address this issue, we decided to choose our affiliated institutions to be the locale of the study to ensure a secure and efficient way of implementing the health education program in a Virtual Learning Environment (VLE).

Moreover, we chose first-year to third-year students because they were easier to reach than the fourth-year students who were completing their OJT (on-the-job training) at the time of the study. Exclusion criteria further include self-reported conditions such as high blood pressure, diabetes mellitus, or a history of recognized mental health or behavioral issues, as well as students who did not attend at least two sessions and refused to continue participating in the research.

Study Period, Recruitment, and Sampling Method

The study was conducted for a period of three months, from May 2021 to July 2021. To recruit participants, we sent a letter of invitation to the Student Affairs Office and the Student Council of the state university and the private college. For three weeks, while waiting for the students' responses to participate, we also advertised on Facebook through our Facebook Page: Amoma Project. After three weeks, 600 participants responded to the invitation and were assessed for eligibility. However, 470 were excluded due to not meeting inclusion criteria (i.e., On-the-Job Training, physical and mental health concerns, taking prescribed medications), and 290 declined to continue participating in the study, with a total of 130 participants. But after one week, 48 students voluntarily participated and met the inclusion criteria, thus reaching the total sample size of 178.

Ethical Consideration

The University Research Ethics Committee (UREC) of Cebu Technological University granted ethical approval to the data collecting procedures, informed consent forms, and data collection instruments with UREC Protocol Number: 001-2021. The participants received a certificate of participation after the duration of the study.

Instrument

Thirty-three questions were created to examine participants' knowledge, attitudes, and practices (22 for knowledge, 6 for attitude, and 5 for practices). The survey questions were designed and updated based on previously published research on MERS-CoV virus outbreaks, World Health Organization infection prevention and control strategies for COVID-19, and the Centers for Disease Control and Prevention guidelines.

After finishing the initial draft of the survey questionnaire, we sent the questionnaire to three experts (two internal medicine specialists and a university professor) for face validation. After consulting with the experts and reaching a consensus, the final questionnaire was developed and pilot-tested by thirty fourth-year college students currently enrolled in a research subject under the lead researcher. The pilot study data were loaded into SPSS v.27 to investigate reliability coefficients. In our study, Cronbach's

alpha coefficients for knowledge, attitude, and practice were 0.60, 0.43, and 0.74, respectively, and for KAP questions, it was 0.73, showing an adequate level of internal consistency [15,16].

Moreover, the instrument undergone forward and backward translation. An expert in Cebuano, a native dialect in the Philippines, translated the English version of the scales into Cebuano and then back into English. The translations were finalized by the bilingual expert and two university professors. The questionnaire was modified based on feedback derived from the students.

The knowledge section contained 22 questions needing a yes or no answer (e.g., SARS-CoV-2 spread through respiratory droplets, which occur when infected people cough and sneeze). Correct responses (Yes) will receive the value 1, while wrong responses (No) will receive the value 0. The cumulative score ranged from 0 to 22, with a higher score reflecting an increase in COVID-19 preventive knowledge.

The attitude part contained six items, with each item's response recorded on a five-point Likert scale. 0 represents "Strongly Disagree," 1 represents "Disagree," 2 represents "Neutral," 3 represents "Agree," and 4 represents "Strongly Agree" (e.g., It is essential to keep my distance from others to avoid spreading SARS-CoV-2). A higher total score indicated more favorable attitudes toward COVID-19 prevention.

The health practices portion contained five practice measures in response to COVID-19, each requiring a yes or no answer (e.g., Have you recently avoided cultural habits such as shaking hands?). The total score for practice items is between 0 and 5, with a higher total score reflecting more frequency in practicing COVID-19 prevention measures. After receiving the completed instruments, the lead researcher checked the respondents' responses for completeness and if it error-free.

The Health Education Program

The online health education program for COVID-19 prevention was designed based on the Communicable Disease Control Health Education Curriculum Analysis Tool (HECAT) and anchored on the Communicable Disease Control and Prevention guidelines. Three experts (two internal medicine specialists and a university professor) and the 30 fourth-year college students who face-validated the instrument were also consulted for the health education program's outline. The validation instrument of the online health education program was adapted from [17] on the Development and Validation of Health Education Tools and Evaluation and consists of the following parameters: topics are of interest to the participants, relevance of the content, and if the information added to the existing body of knowledge.

The initial draft was initially provided to the university professor and the students to assess if the topics were of interest to the participants. After addressing the university professor and students' feedback, the program was sent to two internal medicine specialists to evaluate the relevance of the content and if the information added to the existing body of knowledge. A series of online sessions were held to address the experts' feedback and implement their recommendations. After adopting the recommendations, these three experts authorized the online health education program for implementation.

The following topics were discussed by the approved health education program: 1. What is COVID-19?; 2. Virus variants; 3. Symptoms; 4. Testing; 5. Preventing disease; 6. If you are ill; 7. High-risk groups for COVID-19; 8. Daily activities and going outside; and 9. Vaccines. The objectives of the

health education program were to provide students with an online community and the chance to interact with one another, to educate students about the fundamental concepts of COVID-19, such as transmission prevention, health promotion, and the importance of vaccination, and to equip students with tools to improve their health and well-being during the pandemic. The program's nine sessions were led by the principal researcher with assistance from co-researchers. The sessions lasted 45 to 60 minutes and occurred once every week. The schedule was established based on the participants' agreed-upon date and time. Through online activities, video presentations, demonstrations, messages, and other displays published on the study's social media group, students were taught the program's themes. Zoom® video co ferencing was used to facilitate teaching strategies such as group discussions and dialogue sessions during educational courses. The participants also received PDF booklets and Powerpoint® slides.

Statistical Treatment

Age, sex, and socio-economic levels were expressed as frequencies and percentages. The participants' pre-post knowledge, attitude, and practices regarding COVID-19 prevention were presented as mean with standard deviation. wo-sample paired t-test was performed to assess whether there is a significant difference between the pre- and post-health education knowledge, attitude, and practices of the participants about COVID-19 prevention. The significance level of all tests of differences was set at 0.05. All analyses were conducted with SPSS version 27.

Results

Socio-demographic profile of the participants

As presented in Table 1, the majority of study participants were between the ages of 20 and 22. Mostly females. The majority of participants belong to socio-economic level 5-6, or the lower middle-income group[18,19]. These families have monthly incomes between two and twelve times the poverty threshold (9,520-21,944 PHP/month). This wage group is insufficient to meet their family's demands, especially with the rise in the cost of essential commodities[20]. However, free tertiary education in the Philippines raises college and university enrollment[21].

Table 1: Socio-demographic profile of the participants

Profile	Frequency (N=178)	Percentage (%)
Age		
23 and above	16	8.99
20-21 years old	124	69.66
18 and below	38	21.35
Sex		
Female	136	76.40
Male	42	23.60
Socio-economic Levels		
13-14	0	0.00
11-12	0	0.00
9 – 10	10	5.62
7 – 8	50	28.09
5 – 6	78	43.82
3 – 4	21	11.80
1 – 2	19	10.67

**Socio-economic levels: 13-14 Rich; 11-12 High income; 9 – 10 Upper middle income; 7 – 8 Middle class; 5 – 6 Lower middle class; 3 – 4 Low income*[18].

Test of Significant Difference of the Pretest and Posttest Means of Knowledge on COVID-19 Prevention

The participants' pretest and posttest means with the corresponding sample standard deviation values of the knowledge on COVID-19 prevention are presented in Table 2. The pretest (17.75,±2.27) indicates similar means in the posttest (17.60,±2.95), which indicates that the participants have above-average knowledge of COVID-19 prevention. However, the findings showed no significant difference in the pretest and posttest results.

Table 2. Pretest and Posttest Means of Knowledge on COVID-19 Prevention

Knowledge of COVID-19 Prevention				
Factors	Means	SD	t-value	p-value
Pretest	17.75	±2.27	0.75	0.46
Post-test	17.60	±2.95		

*N=178; SD is Sample standard deviation; df = 176; critical value=1.96; Significance Level $\alpha = 0.05$ in 2-tailed test

Table 3 shows the participants' pretest and posttest means with the corresponding sample standard deviation values on the attitude toward COVID-19 prevention. The pretest (0.57,±1.69) and posttest (1.69,±0.41) indicate an overall rating of strongly agree. The results imply that the participants were aware of the importance of vaccination, social distancing measures, following health protocols, and the essentiality of compliance with government agencies' guidelines against the spread of COVID-19 in both the pretest and posttest. Moreover, the difference between the pretest and the posttest means of attitude toward COVID-19 prevention among the participants is insignificant.

Table 3. Pretest and Posttest Means on Attitude of COVID-19 Prevention

Attitude on COVID-19 Prevention				
Factors	Means	SD	t-value	p-value
Pretest	0.57	±0.42	1.55	0.12
Post-test	1.69	±0.41		

*N=178; SD is Standard Deviation; D –Description: 0.00-1.74 Strongly Agree (SA) 1.75-2.45 Agree(A) 2.45-3.24 Disagree (D), 3.25-4.00 Strongly Disagree (SDA); df = 176; critical value=1.96; Significance Level $\alpha = 0.05$ in 2-tailed test

The participants' pretest and posttest means with the corresponding sample standard deviation values of the means on health practices of COVID-19 prevention are presented in Table 4. The pretest (1.75,±0.97) decreased slightly in the posttest (1.66,±1.08) with a mean difference=0.09. The findings show that although the participants were aware of the importance of vaccination, social distancing measures, following health protocols, and the essentiality of compliance with government agencies' guidelines against the spread of COVID-19, they were not practicing some of the health protocols to prevent the transmission of COVID-19 virus as evidenced by the low means in both the pretest and posttest. The findings showed no significant difference in the pretest and posttest results of the participants.

Table 4. Pretest and Post-test Means on Health Practices of COVID-19 Prevention

Health Practices on COVID-19 Prevention				
Factors	Means	SD	t-value	p-value
Pretest	1.75	±0.97	0.83	0.41
Post-test	1.66	±1.08		

N=178; SD is Sample standard deviation; df = 176; critical value=1.96; Significance Level $\alpha = 0.05$ in 2-tailed test

Discussion

This study assessed an online health education on the knowledge, attitudes, and practices preventing COVID-19 transmission among college students in a state university and private college. The results indicate above-average means of knowledge on COVID-19 prevention in the pretest (17.75,±2.27) and in the posttest (17.60,±2.95). Moreover, the participants were aware of the importance of vaccination, social distancing measures, following health protocols, and the essentiality of compliance with government agencies guidelines. However, the participants were not practicing some of these health measures, as evidenced by the low means in the pretest (1.75, ±0.97) and posttest (1.66,±1.08). All tests for significant differences of pretest and posttest means of knowledge (t=0.75,p-value=0.46), attitude (t=1.55,p-value=0.12), and practices (t=0.83,p-value=0.41) on COVID-19 prevention were all insignificant.

Our findings suggest that the participants were knowledgeable about COVID-19. In the knowledge section of the questionnaire, the participants' overall mean score in the pretest (17.75,2.27) and in the posttest (17.60,2.95) were consistent with previous research indicating adequate levels of understanding about epidemics such as Severe Acute Respiratory Syndrome (SARS-CoV-2)[22] and the Middle East Respiratory Syndrome (MERS-CoV)[1]. In our study, the participants' accurate responses to knowledge-related questions did not come as a surprise. This may be due to the fact that the study was conducted at the height of the COVID-19 pandemic. During this time period, internet, television, and news media may have provided individuals with awareness and knowledge about the disease and its transmission, allowing them to gather information on how to protect themselves and their family from the virus.

Recognizing the government's numerous efforts to prevent misinformation concerning the COVID-19 pandemic is critical. The Department of Health (DOH) and the Inter-Agency Task Force (IATF) have launched a comprehensive public awareness campaign on their website and television. The Department of Health (DOH) and the Inter-Agency Task Force (IATF) engage the public and media, primarily through social media. These initiatives have significantly increased, including public participation in prevention and control measures and attempts to combat misinformation circulated in different media (R. T. Villarino et al., 2021; Vindegaard & Benros, 2020).

Moreover, our research participants were aware of the clinical signs associated with COVID-19. It has been established that viral diseases are contagious among people in close contact (Zimmermann et al., 2020). Vaccination, face mask use, frequent handwashing, and social distancing are all recommended by the World Health Organization and Communicable and Disease Control (CDC, 2020; WHO, 2020) and disseminated this health information through different media. Thus, it was clear that the participants were aware of the importance of adhering to these health protocols, such as wearing face masks and practicing social distancing measures to limit virus transmission.

Health education is a fundamental part of an overall school health program as it provides students with the knowledge and skills they need to maintain good health and well-being [23]. Although our participants know and are aware of these health protocols, adherence to and practicing these health measures to prevent COVID-19 transmission were not practiced. According to Arlinghaus [24], not all knowledge and awareness learned through health education programs necessarily translate into health practices. Despite this, knowledge and awareness are still vital factors in disease prevention, as supported by Ayu et al. [25] that less or limited knowledge about the disease process and risk factors will increase the incidence of the disease. Moreover, Davis [26] stated that among young adults, knowledge and attitude will be the basis of healthy practices later in life. Thus, providing health education programs will be beneficial.

Higher education institutions have supported internet-based activities to promote health awareness and prevent the spread of the COVID-19 virus [8,27]. These online programs are a more viable method due to their ease of access and engagement flexibility (Morgan & Simmons, 2021). A systematic review by Harrer et al. (Harrer et al., 2019) established that online health programs are effective in addressing different health concerns.

Due to the study's design, only mean differences in participants' knowledge, attitude, and practices related to COVID-19 prevention can be derived, and no causal inferences can be drawn. Additionally, the study enrolled students from only two Higher Education Institutions (HEIs); as a result, the findings may not apply to all college students enrolled at other institutions.

Conclusion

Disease awareness is considered the initial step in implementing any health education initiative. Understanding the disease's causes and transmission routes enhances the possibility that people will become more aware of the spread of infectious diseases and the preventative steps to help decrease its transmission. Our study provides evidence that online health education programs improve college students' knowledge and attitudes regarding COVID-19 prevention. However, they did not practice or adhere to some health measures to prevent its transmission. The findings of our study may aid policymakers in identifying target-specific individuals that need health interventions and in developing preventive health education programs for future research.

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