

Knowledge, Attitude, and Practices Towards Standard Precautions on COVID-19 among Nursing Students at A Selected Private College

Diyannah Fadhilah Mahadi¹, Ashwinder Kaur Amarage Singh¹, Kavitha Sundram¹, Nurazlina Md Noor¹, Yee Bit-Lian^{2}*

¹International Medical University

²Open University Malaysia

Abstract. Since January 2021, higher education students are returning to their institutions to continue the banned education with serious application of preventive measures for COVID-19. It is essential to ensure all higher education students have adequate knowledge, favorable attitude, and good practice toward standard precautions for COVID-19. This study to assess the level of knowledge, attitude, and practices toward standard precautions on COVID-19 among nursing students at a private college. This study used a cross-sectional survey and a correlational study among 300 nursing students at a selected private nursing college. Data were collected using a self-administered questionnaire via Survey Monkey. Result of this study was most of the students have moderate knowledge (68.6%), good attitude (72.3%) and often (59%) practice Standard Precautions on COVID-19. For inferential analysis, all dependent variables did not have any relationship when the r-value is less than 1, but the attitude significantly differs significantly between knowledge ($p=0.051$) and practice ($p=0.000$). Moreover, the finding determined that the length of study gave influenced the knowledge ($p=0.030$) and practice ($p=0.010$) while education ($p=0.018$) and occupation ($p=0.026$) gave effect to the practice. Adequate information should be given to nursing students regarding the standard precautions of COVID-19.

Keywords: attitude; covid-19; knowledge; nursing students; practice; standard precautions

Received 17th May 2022 | Revised 30th December 2022 | Accepted 31th December 2022

*Corresponding author at: Open University Malaysia, Faculty of Allied Sciences, 47350 Petaling Jaya, Malaysia

E-mail address: yeebl@oum.edu.my

Copyright ©2022

Published by Talenta Publisher

e-ISSN: 2685-7162

Journal Homepage: <https://talenta.usu.ac.id/IJNS>

1. Introduction

Coronavirus Disease 2019 (COVID-19) has been spreading globally, severely impacting the health and economies around the globe. It is also known as highly contagious and pathogenic. Since its outbreak in December 2019, the World Health Organization (WHO) declared it a pandemic in March 2020 (Jin et al., 2020). Besides, COVID-19 has seriously impacted Malaysia's higher education sector as well. Higher education management faces a considerable challenge to ensure everyone at the higher institutions implements the new norm practice to protect them from COVID-19 infection. Also, to ensure all students in the higher institutions rightly implemented the new norm practice, it is essential to ensure the students have suitable and adequate knowledge, attitude, and practice regarding standard precautions of COVID-19 (Universiti Kebangsaan Malaysia, 2021). On the other hand, our findings are beneficial to enhancing policymakers' awareness of the level of students' knowledge, attitude, and practice of future pandemic outbreaks. Subsequently, the institution may better prepare for preventing and curbing the spread of future pandemics and assist with planning educational interventions for students' awareness.

According to Lee, Kang, & You (2021), the response to this COVID-19 pandemic has been identified as a serious challenge due to the lack of available information on Coronavirus, such as mode of transmission, double-time outbreaks, and reproductive frequency. Other than that, a study conducted by Hatabu et al. (2020) also noted that the massive spread of this virus had caused many governments worldwide to shut down and interrupt citizens' economic/social growth during rapid infections. Unfortunately, the effectiveness of these initiatives is significantly linked to knowledge, attitudes and preventive practices (KAP) toward COVID-19 among citizens (Wen et al., 2021). The virus continued to spread despite the lockdown due to ignorance, attitude and lack of information. A study by Angelo, Alemayehu, & Dacho (2021) mentioned that knowledge, attitude, and practices (KAP) are important in managing disease transmission. Understanding the cause of COVID-19, its signs and symptoms may facilitate the proactive application of this disease's preventive measures. As higher educational institutions students cope and learn to adapt to the new norm, students from all walks of life slowly return to their institutions with stringent preventive measures (Al Ahdab, 2021; Albaqawi et al., 2020). At this stage of the virus, it is commonly known that higher education students are more at risk of being infected and forming a new cluster of COVID-19 infections where a single COVID-19 case can cause rapid spread. Despite being on campus during the MCO and RMCO, it is essential to prepare nursing students as, eventually, the nursing students will need to perform their clinical practice. Nursing students can practice regardless of where nursing students are situated.

It was paramount for key decision-makers and students in higher institutions to apply prevention measures and standard precautions to prevent the formation of a new cluster among nursing students. Based on the literature review, most of the previous research was conducted for the

public to understand and assist with the pandemic. Such research did not include specific demographic and groups of students, such as student nurses in Malaysia. Student nurses attending the clinical placement or attached to the healthcare setting were among those affected by the virus's spread. It was crucial to have a process in place for them to avoid the virus spreading among nursing students. Student nurses had to ensure compliance and practice a new standard of procedure. They should show high competency in implementing the standard prevention of COVID-19 either in the clinical or public areas while applying the KAP theory. It is because nursing students are also commonly identified as role models in today's society.

This research aimed to learn how many nursing students understand and implement the standard precaution for COVID-19 by using structured questionnaires adopted from the survey conducted by Saefi et al. (2020). Then, we will identify the relationship between knowledge and attitude, knowledge and practice, and attitude and practice among nursing students on standard precautions for COVID-19. Finally, we will determine the association between the nursing students' sociodemographic characteristics with their level of knowledge, attitude, and practice regarding the standard precaution against COVID-19.

2. Research Methods

This research used cross-sectional and correlational studies as the method of choice. The research design of this study was planned based on the project's objectives. This study was conducted at a selected private college located in Klang Valley, Malaysia. Approximately 323 nursing students were included in the study population. The nursing students were from several nursing programs, including Diploma in Nursing, Advanced Diploma in Midwifery, Post Basic in Intensive Care Nursing, Post Basic in Renal Nursing, Post Basic in Pediatric Nursing, and Post Basic Perioperative Nursing. This study used the Raosoft sample size calculation to calculate the sample size of this study. However, to anticipate the problem of non-response and missing values, the researcher approached more than the calculated sample size. Based on Raosoft sample size calculation, with a 5% margin error, 95% confidence interval, and 50% distribution rate, the recommended sample size is 176. In addition, the actual sample size with a more than 50% attrition rate is 300. Yet, in this study, we decided to recruit 300 samples which is more than 50% of the recommended sample size. Other than that, for the online survey, it can get more participants involved in the online survey to ensure a 100% response rate. Therefore, we recruited another 124 nursing students to generate a more valid result that reflects the target population as needed. A 100% response rate with the total sample size of this study was 300 (Memon et al., 2020).

There are several inclusion and exclusion criteria for this study. The inclusion criteria are nursing students who studied at the selected college. The students who are willing to participate in this

study and any gender. In exclusion criteria, nursing students on study leave and the nursing student who participated in the pilot study.

The Monkey Survey[®] questionnaire was used as a basis to develop self-scoring forms to gather inputs from respondents. It was not feasible to conduct a population-based survey due to the campus closure at the time of data collection. The researchers opted to use Monkey Survey[®] for enrolling potential participants. The participants were required to complete the consent form before reaching the URL for the main study. The link provided to undergraduate nursing students used a combination of convenient and snowball techniques. This questionnaire was adopted from the survey conducted by (Saefi et al., 2020) on the title survey data of COVID-19-related knowledge, attitude and practices among Indonesian undergraduate students. The questionnaire's tools contain four sections. Starting with section A for socio-demographic data (six closed-ended items), section B for nursing student knowledge of the standard precaution on COVID-19 (13 closed-ended items), section C for nursing student's attitudes (six open-ended items) and section D for nursing student practice (11 open-ended items). The questionnaire used was tested and validated in the previous study by Saefi and colleagues (2020). They further re-validated using Rasch model measurement, showing that the questionnaire has acceptable reliability and validity, with Real item reliability of 0.97 for the attitude scale, 0.98 for the knowledge scale, and 0.99 for the practice scale.

Two analyses are being used, which are descriptive analysis and inferential analysis. The inferential analysis is used to determine the relationship between knowledge with attitude, knowledge with practice, and attitude with practice from the *r* and *p*-value using the spearman rank correlation test. The inferential analysis was used to determine the association between sociodemographic characteristics with knowledge, attitude, and practice using the Kruskal Wallis test for more than two variables and the Mann - Whitney U test for two categorical data characteristics of respondents with all the dependent variables. The Kolmogorov-Smirnova test was used to determine the *p*-value since the number of respondents is 271. Non-parametric analysis was used in the data analysis since the *p*-value for knowledge, attitude, and practice showed 0.000, where the *p*-value is less than 0.05.

3. Research Results

a. Sociodemographic Characteristic

The response rate of this study is 90.33% (n=271). The finding shows that 90% of respondents participated in this study, and most were female, 89.7% (n=243), with an average age between 21 and 30 years of 51.3% (n=139), as shown in Table 1. Moreover, the finding was also determined that most of them have three years length of study with 63.1% (n=171), while only two students have four years length of study.

Table 1 Sociodemographic characteristics of the respondents (n=271)

Sociodemographic Characteristics	Frequency (n)	Percentage(%)
Gender		
Male	28	10.3
Female	243	89.7
Age		
<20 years	110	40.6
21-30 years	139	51.3
>30 years	22	8.1
Length of study		
1 year	69	25.5
2 year	29	10.7
3 year	171	63.1
4 year	2	0.7
Education Undertaking		
Diploma	214	79.0
Post Basic	57	21.0

Table 2 Level of Knowledge towards Standard Precautions on COVID-19 among Nursing Students

No	Question	Correct n (%)	Incorrect n (%)
1	Avoid travel across cities can prevent the spread of COVID-19?	257 (94.8)	14 (5.2)
2	People with COVID-19 who have chronic diseases such as diabetes, heart disease, and obesity have an increasingly severe condition?	256 (94.5)	15 (5.5)
3	People with COVID-19 also show no symptoms, called OTG (People without Symptoms)?	254 (93.7)	17 (6.3)
4	Currently, there is no effective drug for COVID-19, but the treatment of early symptoms and intensive care can help people with COVID-19 to recover?	249 (91.9)	22 (8.1)
5	People with COVID-19 who show no symptoms or OTG (People without symptoms) cannot infect the virus to others?	232 (85.6)	39 (14.4)
6	The dead bodies of people with COVID-19 who have not been buried can be source of the spread of the COVID-19 virus?	229 (84.5)	42 (15.5)
7	COVID-19 only spreads through objects, and it is not airborne?	223 (82.3)	48 (17.7)
8	The transmission of the COVID-19 virus can be prevented by not touching the face?	208 (76.8)	63 (23.2)
9	People with a strong immune system will not get infected with COVID-19	186 (68.6)	85 (31.4)
10	Not everyone with COVID-19 has an increasingly severe condition, except the elderly?	182 (67.2)	89 (32.8)
11	The buried dead bodies of people with COVID-19 can be a source of the spread of COVID-19?	152 (56.1)	119 (43.9)
12	COVID-19 cannot penetrate cloth masks that are commonly worn by the public?	122 (45.0)	149 (55.0)
13	Children and teenagers do not need to make efforts to prevent COVID-19 infection because they have a strong immune system	37 (13.7)	234 (86.3)

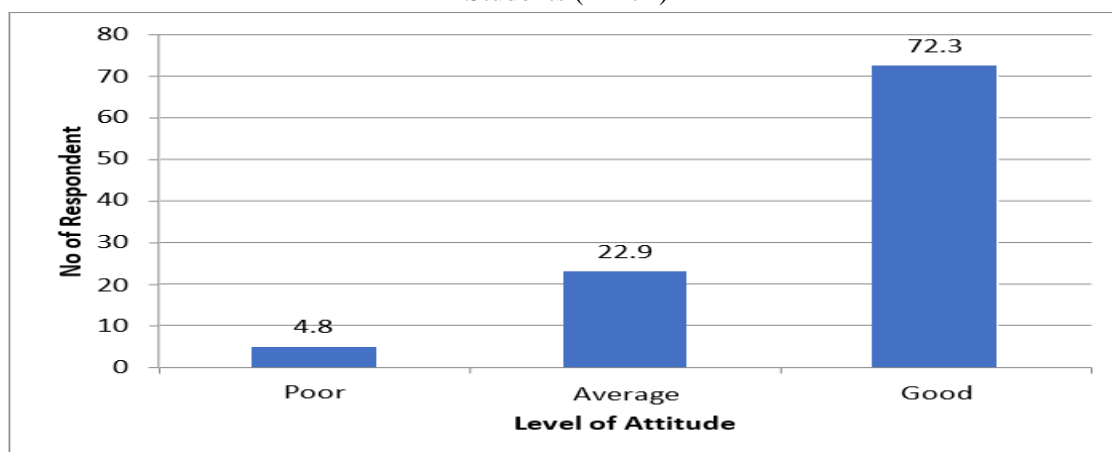
In general, the classification of the knowledge level towards standard precautions on COVID-19 among nursing students based on a low score is between 0 and 49, a medium score is between 50 and 79, and a high score is between 80 and 100. The finding has determined that most students have a moderate level of knowledge (68.6%), and only 4.8% have a low level of knowledge (Table 2).

The respondent's maximum total score on knowledge of standard precautions on COVID-19 among nursing students is 100%, and the minimum score is 15.38%. The respondents' mean rank total score is 73.43%, which determines that most respondents have a moderate knowledge of standard precautions for COVID-19 among nursing students. The respondents' attitude towards standard precautions on COVID-19 among nursing students. Most of the respondents answered correctly for most of the questions except for question 4 regarding *All people with COVID-19 are those who violate the government's call in the efforts to prevent transmission of COVID-19*, which respondents answered neither agree nor disagree with $n=106$ (39.1%) is higher compared with agree $n=101$ (37.3%) and disagree $n=64$ (23.6%).

Most of the respondents answered most of the questions correctly, especially question 3 regarding *Keeping up with the information regarding the government's call for COVID-19 preventive efforts is important for the community* with $n=226$ (83.4%), and question 6 regarding *People with COVID-19 who isolate themselves shows that they have a responsibility in preventing the transmission of COVID-19* with $n=241$ (88.9%) when the value near with 100%.

The classification of attitude levels toward standard precautions on COVID-19 among nursing students based on the poor score is between 0 and 49, the average score between 50 and 79, and the good score between 80 and 100. The finding has determined that most students have a good attitude (72.3%), and only 4.8% have a poor attitude. The respondent's maximum total score on attitude toward standard precautions on COVID-19 among nursing students is 100%, and the minimum score is 0.00%. The respondents' mean rank total score is 82.29%, which has to determine that most of the respondents have a good attitude toward standard precautions for COVID-19 among nursing students.

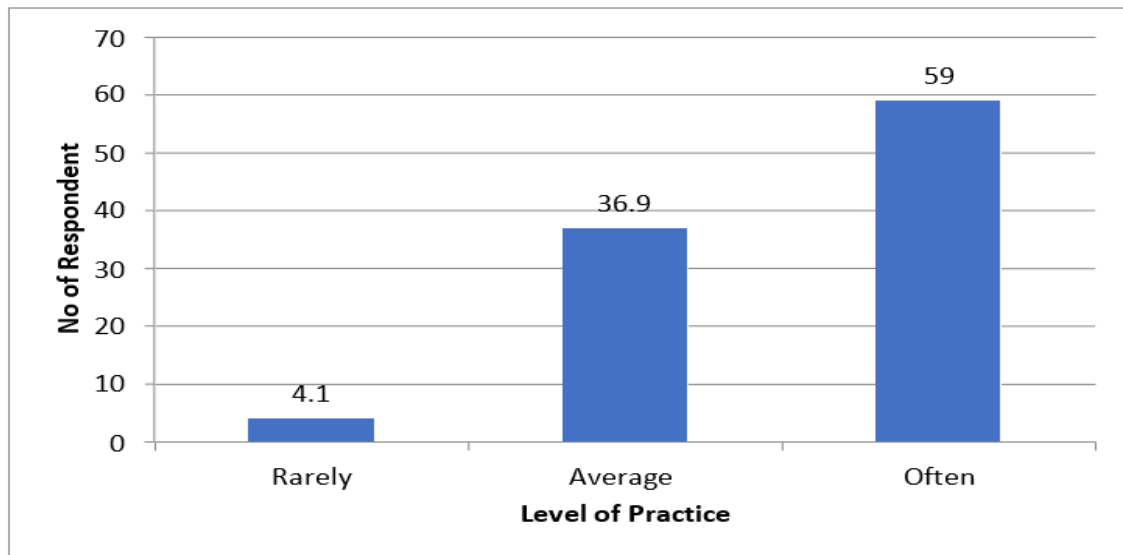
Figure 1 Level of Attitude towards Standard Precautions on COVID-19 among Nursing Students ($n=271$)



The level of practice towards standard precautions on COVID-19 among the nursing students (Figure 2), most of the students practice standard precautions except for question 8 regarding *I Have been exercising routinely* when most of the students occasionally answer with $n=167$ (61.6%). Also, most respondents practiced all the questions. Especially on question 1 regarding

Have you implemented physical distancing when you were in the crowd with n=233 (86%), question 2 regarding *Have you used hand sanitizer when you were in crowded places* with n=234 (86.3%) and question 11 regarding *I have been practicing hand hygiene whenever I go or do* with n=240 (88.6%).

Figure 2 Level of Practice towards Standard Precautions on COVID-19 among Nursing Students (n=271)



Although most of the respondents answered they are practicing taking vitamins or supplements to increase their immune system, as mentioned in question 9 with n= 121 (44.6%), the other 55.6% of respondents occasionally answered (39.5%) and not practicing (15.9%) on taking any supplements as precautions on COVID-19 with n=107 and n=43. The classification of the level of practice towards Standard Precautions on COVID-19 among nursing students is based on rare scores between 0 and 49. The average score is between 50 and 79. Often score is between 80 and 100. The finding has determined that most students have a frequent level of practice (59%), and only 4.1% have rarely practiced standard precautions for COVID-19. The respondent's maximum total score on practice towards standard precautions on COVID-19 among nursing students is 100%, and the minimum score is 0.00%. The respondents' mean rank total score is 81.13%, which must be determined. Most respondents have often practiced standard precautions for COVID-19 among nursing students.

Kruskal Wallis and Mann Whitney U-test were used to determine the association between sociodemographic characteristics with the knowledge, attitude and practices towards standard precautions on COVID-19 among nursing students. Gender, education, and occupation, while Kruskal Wallis tested the age and length of student studies. The finding has determined that only the length of studies influences nurses' knowledge of standard precautions for COVID-19 (p=0.030). This is shown when the mean rank for four years (27.50) is highly different from 3 years (130.50). However, gender, age, education, and occupation did not influence the knowledge

when the findings show the P-value is more than 0.05. The mean rank has only a slight difference between groups.

The finding has determined that all the sociodemographic characteristics did not influence the attitude of the nurses towards standard precautions on COVID-19 when the p-value for all characteristics is more than 0.05. It is shown when the mean rank slightly differs between groups in all characteristics.

The finding has determined that the length of nurses' study ($p=0.010$) and education ($p=0.018$) influenced the practice of nurses towards Standard Precautions on COVID-19. This is shown when the mean rank for four years (71.25) is highly different from three years (125.89) for the length of study, while post-basic (157.68) and diploma (130.23) mean rank also shows highly different. Moreover, the occupation also influenced students' practice when the p-value shows 0.026, which is less than 0.05. The mean rank also shows a high difference between the student (130.49) and the student and worker (156.22). However, gender ($p=0.571$) and education ($p=0.718$) did not influence the practice when the findings show the p-value is more than 0.05, and the mean rank only slightly differs between groups.

Table 3 Respondent's Demographic Characteristics with Knowledge of Standard Precautions on COVID-19 among Nursing Students

Sociodemographic characteristics	Mean Rank	p-value
Gender		
Male	134.91	0.936
Female	136.13	
Age		
<20 years	136.17	0.685
21-30 years	133.82	
>30 years	148.95	
Length of Study		
One year	141.63	0.030*
Two years	162.53	
Three years	130.50	
Four years	27.50	
Education Undertaking		
Diploma	132.21	0.111
Post Basic	150.21	

* Significant value, $p < 0.05$

Table 4 Respondent's Demographic Characteristics with Attitudes towards Standard Precautions on COVID-19

Socio-demographic characteristics	Mean Rank	p-value
Gender		
Male	131.71	0.755
Female	136.49	
Age		
<20 years	136.81	0.435
21-30 years	132.37	
>30 years	154.91	
Length of Study		
1 year	148.09	0.339
2 years	144.67	
3 years	129.94	
4 years	111.50	
Education undertaking		
Diploma	132.83	0.187
Post Basic	147.89	

*Significant value, $p < 0.05$

Table 5 Respondent's Demographic Characteristics with Attitudes towards Standard Precautions on COVID-19

Sociodemographic characteristics	Mean Rank	p-value
Gender		
Male	128.11	0.571
Female	136.91	
Age		
<20 years	139.51	0.718
21-30 years	132.29	
>30 years	141.86	
Length of Study		
One year	160.89	0.010*
Two years	140.83	
Three years	125.89	
Four years	71.25	
Education Undertaking		
Diploma	130.23	0.018*
Post Basic	157.68	

*Significant value, $p < 0.05$

In conclusion, 271 respondents participated in the study, and the descriptive analysis was presented by frequency and percentage in the table and figure. Most respondents were female (89.7%), with an average age of 21-30 years old (51.3%) and three years of length of study (63.1%). Moreover, most of the respondents that participated in the study have a diploma (79%) and full-time students (78.6%). For descriptive analysis, we have determined that most of the students have moderate knowledge (68.6%), good attitude (72.3%) and often (59%) practice standard precautions on COVID-19.

For inferential analysis, the non-parametric analysis was used in this study when the normality test showed it was not normal. Spearman rank tests were used to determine the relationship between dependent variables. In contrast, Kruskal Wallis and Man Whitney U-test were used to determine a sociodemographic association between dependent variables. Based on the result, all dependent variables did not have any relationship when the r-value is less than 1, but the attitude significantly differs significantly between knowledge ($p=0.051$) and practice ($p=0.000$). Moreover, the finding determined that the length of the study influenced knowledge ($p=0.030$) and practice ($p=0.010$). In comparison, education ($p=0.018$) and occupation ($p=0.026$) influenced the practice.

4. Research Discussion

The study findings of the relationship between nursing student's knowledge, attitude, and practices towards standard precaution on COVID-19 and the correlation with their demographic data, a detailed discussion was held, followed by implications and limitations of this study, together with recommendations for the future study regarding precautions on COVID-19.

This study aimed to evaluate nursing students' knowledge, attitude, and practice regarding COVID-19 standard precautions. The research used a stable and updated version of the structured questionnaire established by Saefi et al. (2020), which consisted of four parts and 36 questions.

This study found that 68.6% of nursing students had a moderate level of knowledge. It also found that most nursing students are knowledgeable about the categories of individuals that are more vulnerable to being infected with COVID-19, and avoiding crowded places can prevent COVID-19 infection. This study's findings showed the same findings as the study conducted by Saefi et al. (2020), where the students were aware of avoiding crowded places and used a face mask to prevent any COVID-19 infection. In Malaysia, the Ministry of Health (MOH) has introduced compulsory norms for public practices, including avoiding crowded places, social distancing, and using a face mask in public areas (Angelo et al., 2021). These new norms introduced by the government are known to be one of the factors in influencing nursing students to be more knowledgeable about preventing COVID-19 infection, rather than relying on the theoretical knowledge of COVID-19 alone, such as how the coronavirus is transmitted (Wu, Chen, & Chan, 2020).. However, a study by Prasad Singh et al. (2020) reported that up to 70% of the students had shown good knowledge regarding safety precautions of COVID-19, primarily related to the symptoms and signs of COVID-19, mode of transmission of COVID-19, and preventive measures.

Based on our observations, the college management also provided a guideline for the students regarding the COVID-19 standard precautions, which may enhance the student's knowledge. Unfortunately, the students are only aware of how to avoid being infected by COVID-19 but need

more awareness and knowledge about this virus. COVID-19, caused by a new strain of the virus, might be why some students were unaware of this pandemic before the breakout since they only focused on how to avoid getting infected. It is also recognized as the main factor for the students having a moderate level of knowledge regarding COVID-19.

Next, this study found that most participants showed a good attitude toward standard precautions against COVID-19, with 72.3% of them. Most of the students agreed that keeping up with the information regarding the government's call for COVID-19 preventive efforts is important for the community (83.4%), and question 6 regarding People with COVID-19 who isolate themselves shows that they have a responsibility to prevent the transmission of COVID-19 (88.9%). It is shown that nursing students had a good attitude toward preventing COVID-19 transmission. Nursing students showing a good attitude may also be closely related to their engagement with any information related to COVID-19 provided by the Ministry of Health and their awareness of the current situation of COVID-19 in Malaysia. Air droplets can easily transmit coronavirus from infected patients.

Therefore, as nursing students, having a good knowledge regarding infectious diseases by air droplet has encouraged them to show a good attitude towards COVID-19 standard precautions. A previous study has shown similar findings to this study, where nursing students are more aware of the current situation of COVID-19 compared to other university students from different courses. They have to be educated to enhance their awareness and show a good attitude toward COVID-19 standard precautions (Al-Dossary et al., 2020). Finally, self-awareness regarding the importance of working together to stop the transmission of COVID-19, especially in Malaysia, is also known as one factor for the students to show good attitudes towards COVID-19 standard precautions.

In terms of practice, most nursing students also showed good practice towards COVID-19 standard precautions, with 59% of them often practicing the COVID-19 standard precautions, especially in public areas. The most practiced COVID-19 standard precautions among nursing students included implementing physical distancing, using hand sanitizer, and practicing hand hygiene in crowded places, with 86%, 86.3%, and 88.6%. No similar study has been conducted previously to be compared with the findings of this study. However, the practices mentioned, known as new norms, were announced by the Ministry of Health last year when COVID-19 cases started being identified in Malaysia.

Other than that, university students and all individuals in Malaysia must implement those practices to prevent the transmission of COVID-19. Besides, all venues in Malaysia, such as restaurants, public toilets, and shopping malls, should put up signs or any written cautions regarding the new norms, which may enhance the students on having a good practice of COVID-

19 standard precautions. Not only when they are in the college compound but also in public areas (Azlan et al., 2020).

This study found a significant difference between knowledge and attitude and attitude and practice only when the p-value is less than 0.05, $p=0.051$ and $p=0.000$, respectively. It was found that the more knowledgeable students regarding the COVID-19 standard precautions, the nursing student showed a favorable attitude towards the COVID-19 standard. For example, the nurses keeping up with the government's call for COVID-19 preventive efforts become more knowledgeable about preventing COVID-19 transmission, including avoiding crowded places and using face masks in public areas. They are knowledgeable about the mode of transmission of Coronavirus through air droplets from the infected individual. Besides, a previous study showed that a high level of knowledge regarding a specific area among individuals might increase awareness of an individual regarding the specific area and then promote an individual having a favorable attitude about the specific area (De Pretto et al., 2015).

According to the Malaysia Ministry of Health, adequate information regarding COVID-19 and how to stop its transmission should be given to the public to show self-awareness to prevent themselves from this virus. It is also positively associated with their attitude toward preventing the coronavirus from spreading in the community (Mat Din, Raja Adnan, Nor Akahbar, & Minhat, 2020). Also, an individual equipped with the latest and adequate knowledge regarding COVID-19 may know how dangerous this virus is to their body and can lead to fatal due to multi-organ failure. Therefore, an individual tends to have a favorable attitude toward COVID-19 standard precautions and can actively stop spreading the coronavirus in the community (Anis et al., 2020).

Next, this study reported that the nursing students who showed a favorable or good attitude towards COVID-19 standard precautions also often practiced the COVID-19 standard precautions in their daily life. For example, nursing students have a good attitude by keeping up with the information given by the government related to the prevention of COVID-19. Then it also encouraged the new norms fixed by the government, including implementing physical distancing, using hand sanitizer, and practicing hand hygiene in crowded places. A good attitude towards COVID-19 standard precautions encouraged them to implement the related practice related to the COVID-19 standard precautions.

The awareness of the importance of stopping the spreading of Coronavirus encouraged nursing students to practice new norms related to the COVID-19 standard precautions. Besides, the nursing students' attitude, where the previous study had mentioned that the nursing students have more awareness about their health, may encourage them to implement healthy lifestyles to prevent them from being infected by any diseases. Finally, attending nursing schools encouraged nurses to be aware of the current situation of COVID-19 in Malaysia, which may have influenced the practice of COVID-19 standard precautions in daily life (Azlan et al., 2020).

The length of the study may influence the level of knowledge on COVID-19 standard precautions with $p=0.030$. The level of practice on COVID-19 standard precautions might be influenced by the nursing students' length of study, current educational level, and occupation, with $p=0.010$, $p=0.018$, and $p=0.026$, respectively.

Firstly, this study found that second-year nursing students showed a good knowledge of COVID-19 standard precautions compared to fourth-year nursing students. It might be due to second-year students having more exposure to the knowledge related to COVID-19 and its standard precautions than fourth-year nursing students. Other than that, the fourth-year nursing students, also known as the final-year students, are too busy with the final-year project that needs to be presented at the end of the fourth year of the study period. Therefore, it is also identified as the fourth-year nursing students' barrier to acquiring adequate knowledge of COVID-19 and its standard precautions. Besides, the second-year nursing students also had experience undergoing a clinical placement in an actual clinical area.

During the clinical placement period, nursing students can develop good networking with staff nurses. Good networking with the staff nurses, especially those working in a hospital setting, may encourage the nursing students to get the latest knowledge regarding COVID-19 from the staff nurses, especially those working as front-liners in treating COVID-19 patients.

Next, in terms of the practice of COVID-19 standard precautions, first-year nursing students, nursing students with the post-basic as the current highest educational status, and part-time nursing students who are work staff nurses at the same time often show practicing the COVID-19 standard precautions. The first-year nursing students showed good practice of COVID-19 standard precautions.

Based on our observations in the college area, the first-year nursing students obey the COVID-19 guidelines provided by the college compared to the nursing students from the other years of study. The junior students can follow the guidelines provided by the management strictly compared to senior students. Other than that, most first-year nursing students were first-timers in college life, where it is easier to follow the instructions from the college's management.

Besides, nursing students with the most basic the highest educational status often practice COVID-19 standard precautions. They have more exposure to infectious diseases, enhancing their practice regarding the standard precautions for infectious diseases. Also, they tend to show more skill in practicing the standard precautions of COVID-19.

The post-basic nursing students have more theoretical and practical knowledge regarding infectious diseases with a mode of transmission similar to COVID-19. They are also experienced

in handling infectious diseases in the actual clinical area. All related experienced and exposures may encourage them to show good practice toward COVID-19 standard precautions.

The part-time nursing students have also shown good practice of COVID-19 standard precautions compared to full-time nursing students. Most part-time nursing students also work as staff nurses in the actual clinical area, especially in hospitals. Some of them had the opportunity to work in the isolation ward of COVID-19 or with COVID-19 patients. This working environment encouraged them to employ the practice related to COVID-19 standard precautions as their routine in the clinical area and daily life.

Our study has limitation to be acknowledged. The proportion of participants in each year should be distributed equally. The stratified sampling could be applied based on the cross-sectional study and improve the findings. Since the number in each year is extremely different in the findings, it may affect the significant correlation between the lean of the study and other dependent variables.

5. Conclusions and Recomendations

In conclusion, this study found that most nursing students (68.6%) have moderate knowledge regarding COVID-19 standard precautions. Still, most of them showed a good attitude and often practiced the COVID-19 standard precautions daily, with 72.3% and 59% of them, respectively. Then, there is a significant difference between knowledge and attitude and attitude and practice only when the p-value is less than 0.05, $p=0.051$ and $p=0.000$, respectively. The length of the study may influence the level of knowledge on COVID-19 standard precautions with $p=0.030$. The level of practice on COVID-19 standard precautions might be influenced by the nursing students' length of study, current educational level, and occupation, with $p=0.010$, $p=0.018$, and $p=0.026$, respectively.

Even though most nursing students show a good attitude and often practice the COVID-19 standard precautions, most still have moderate knowledge regarding COVID-19 standard precautions. Therefore, the education program intervention related to the theoretical and practical knowledge of COVID-19 standard precautions should be provided by the higher education institutions themselves to their students. It is compulsory to ensure all higher education students are knowledgeable about the COVID-19 standard precautions. It then may ensure that all the students strictly follow the new norm in their daily life. Finally, it is also one of the initiatives to prevent any COVID-19 transmission among higher education students and promote a safe learning environment in Malaysia's higher education institutions.

Acknowledgments

Foremost, we would like to express our gratitude to the management of International Medical College (IMC) for allowing us to conduct this research. This study is funded by IMU Joint

Committee on Research and Ethics (Ref no: 4.7.JCM-208/2020 and project ID no: BNI/2020(PR-46).

References

- [1] Al-Dossary, R., Alamri, M., Albaqawi, H., Al Hosis, K., Aljeldah, M., Aljohan, M., ... Almazan, J. (2020). Awareness, Attitudes, Prevention, and Perceptions of COVID-19 Outbreak among Nurses in Saudi Arabia. *International Journal of Environmental Research and Public Health*, 17(21), 1–16. <https://doi.org/10.3390/ijerph17218269>
- [2] Al Ahdab, S. (2021). A Cross-Sectional Survey of Knowledge, Attitude and Practice (KAP) towards COVID-19 Pandemic among The Syrian Residents. *BMC Public Health*, 21(296), 1–7. <https://doi.org/10.1186/s12889-021-10353-3>
- [3] Albaqawi, H. M., Alquwez, N., Balay-odao, E., Bajet, J. B., Alabdulaziz, H., Alsolami, F., Cruz, J. P. (2020). Nursing Students' Perceptions, Knowledge, and Preventive Behaviors Toward COVID-19: A Multi-University Study. *Frontiers in Public Health*, 8(1), 1–9. <https://doi.org/10.3389/fpubh.2020.573390>
- [4] Angelo, A. T., Alemayehu, D. S., & Dacho, A. M. (2021). Knowledge, Attitudes, and Practices Toward Covid-19 and Associated Factors Among University Students in Mizan Tepi University, 2020. *Infection and Drug Resistance*, 14, 349–360. <https://doi.org/10.2147/IDR.S299576>
- [5] Anis, S. N. M., Ibrahim, M. A., Tahir, L. M., Abu, B., Khan, A., & Aziz, R. A. (2020). COVID 19 and Campus Experience: Survey on Online Learning and Time Spent During The Movement Control Order (MCO) among Malaysian Postgraduates. *Journal of Advanced Research in Dynamical and Control Systems*, 12(7), 2929–2933. <https://doi.org/10.5373/jardcs/v12sp7/20202437>
- [6] Azlan, A. A., Hamzah, M. R., Sern, T. J., Ayub, S. H., & Mohamad, E. (2020). Public Knowledge, Attitudes and Practices towards COVID-19: A Cross-sectional Study in Malaysia. *PloS One*, 15(5), 1–15.
- [7] De Pretto, L., Acreman, S., Ashfold, M. J., Mohankumar, S. K., & Campos-Arceiz, A. (2015). The Link between Knowledge, Attitudes and Practices in Relation to Atmospheric Haze Pollution in Peninsular Malaysia. *PloS One*, 10(12), 1–18. <https://doi.org/10.1371/journal.pone.0143655>
- [8] Hatabu, A., Mao, X., Zhou, Y., Kawashita, N., Wen, Z., Ueda, M., ... Tian, Y.-S. (2020). Knowledge, Attitudes, and Practices Toward COVID-19 among University Students in Japan and Associated Factors: An Online Cross-sectional Survey. *PLoS One*, 15(12), 1–19. <https://doi.org/10.1371/journal.pone.0244350>
- [9] Jin, Z., Luo, L., Lei, X., Zhou, W., Wang, Z., Yi, L., & Liu, N. (2020). Knowledge, Attitude, and Practice of Nurses Towards the Prevention and Control of COVID-19. *Research Square*, 1–18. <https://doi.org/10.21203/rs.3.rs-45450/v1>
- [10] Lee, M., Kang, B.-A., & You, M. (2021). Knowledge, Attitudes, and Practices (KAP) Toward COVID-19: A Cross-Sectional Study in South Korea. *BMC Public Health*, 21(1), 1–10. <https://doi.org/10.1186/s12889-021-10285-y>
- [11] Mat Din, H., Adnan, R. N. E. R., Akahbar, S. A. N., & Minhat, H. S. (2021). Assessment of Knowledge, Attitudes and Practices towards COVID-19 among Malaysian Older Adults During the Pandemic. *Asian Journal of Behavioural Sciences*, 3(1), 1–12. <https://doi.org/10.2196/21888>

- [12] Memon, M. A., Ting, H., Cheah, J.-H., Thurasamy, R., Chuah, F., & Cham, T. H. (2020). Sample Size for Survey Research: Review and Recommendations. *Journal of Applied Structural Equation Modeling*, 4(2), 1–20. [https://doi.org/10.47263/jasem.4\(2\)01](https://doi.org/10.47263/jasem.4(2)01)
- [13] Prasad Singh, J., Sewda, A., & Shiv, D. G. (2020). Assessing the Knowledge, Attitude and Practices of Students Regarding the COVID-19 Pandemic. *Journal of Health Management*, 22(2), 281–290. <https://doi.org/10.1177/0972063420935669>
- [14] Saefi, M., Fauzi, A., Kristiana, E., Adi, W. C., Muchson, M., Setiawan, M. E., Ramadhani, M. (2020). Survey Data of COVID-19-related Knowledge, Attitude, and Practices among Indonesian Undergraduate Students. *Data in Brief*, 31, 1–10. <https://doi.org/10.1016/j.dib.2020.105855>
- [15] Universiti Kebangsaan Malaysia. (2021). COVID-19: Adapting to the New Norm in the Higher Education Institutions. Retrieved December 3, 2022, from <https://www.ukm.my/pkk/covid-19-adapting-to-the-new-norm-in-the-higher-education-institutions/>
- [16] Watkins, J. (2020). Preventing a Covid-19 Pandemic. *BMJ*, 368(m810). <https://doi.org/10.1136/bmj.m810>
- [17] Wen, X., Wang, F., Li, X., & Gu, H. (2021). Study on the Knowledge, Attitude, and Practice (KAP) of Nursing Staff and Influencing Factors on COVID-19. *Frontiers in Public Health*, 8, 1–6. <https://doi.org/10.3389/fpubh.2020.560606>
- [18] Wu, Y.-C., Chen, C.-S., & Chan, Y.-J. (2020). The Outbreak of COVID-19: An Overview. *Journal of the Chinese Medical Association (JCMA)*, 83(3), 217–220. <https://doi.org/10.1097/JCMA.0000000000000270>