Examining Students' Knowledge and Attitudes Towards Better Practices in Combating COVID-19 Pandemic

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ABSTRACT

The COVID-19 pandemic has changed the habits that have become the practice of many people recently, in order to adapt to a "new normal". On 30th January 2020, the World Health Organization (WHO) declared COVID-19 a public health emergency that has set off an international concern. Surprisingly, in the first week of March, a number of shocking new cases were reported globally, and COVID-19 appeared as an epidemic. On March 12, 2020, there were more than 125,000 confirmed cases in 118 countries and more than 4600 deaths were reported. A poor understanding and lack of knowledge regarding COVID-19 especially among students may contribute to delayed treatment and the rapid spread of infection. Therefore, this study aimed to investigate the knowledge, attitude, and practices among students on COVID-19 at this critical time. A cross-sectional survey of the 21-item instrument was adapted and distributed online using a google form to undergraduate students during the first week of April 2020. The questionnaire was designed to determine students' knowledge, attitudes, and practices towards COVID-19. A total of 610 undergraduate students were assessed in this study. The results showed that overall, majority of the students have high knowledge and only a few showed moderate respond. Meanwhile, attitudes and practices indicated a good response to COVID-19. In conclusion, students are reported to have good knowledge, optimistic attitudes, and appropriate practices towards the COVID-19 pandemic. This study is both significant and beneficial for the researchers, educators, ministry of health, and the public to keep the knowledge, attitudes, and practices on COVID-19 in line.

Keywords: *knowledge, attitude, practices, students, COVID-19*

INTRODUCTION

When China first reported a case of pneumonia that appeared in Wuhan to the World Health Organization (WHO) on December 31, 2019, it did not get much world attention. Even the world powers such as the United States and Britain do not show concern or annoyance in facing it. Most likely because it happened in China or more precisely in Wuhan which only involved 59 people out of its 19 million population, coupled with no reported deaths.

Currently, the situation is different, when the pandemic known as Covid-19 which was overlooked in its early stages has now "explored" almost all over the world. To date, there are nearly 2,184,714 Covid-19 cases with a total death toll of 146,898 people worldwide. The current situation shows the world superpower, the United States, which at first did not pay much attention to the "death virus" leading to a total of 678,210 cases and has resulted in the loss of 34,641 people (Mohd Amirul Akhbar, April 19, 2020)

On 18th March 2020, Malaysia has announced the Restricted Movement Control (RMC) to all Malaysians when COVID-19 virus started to explode drastically. And up to this point, a huge number of positive cases were detected where there were 4,346 of total cases, 2,446 cases of under treatment and 70 deaths (KKM, 10 April 2020).

However, Malaysia has gone through the final recovery phases and monitoring will be done from time to time. The preventive measures are as below:

- Phase 1 - Movement Control Order (MCO) from 18th till 31st March 2020
- Phase 2 - Movement Control Order (MCO) from 01st till 14th April 2020
- Phase 3 - Movement Control Order (MCO) from 15th till 28th April 2020
- Phase 4 - Movement Control Order (MCO) from 29th till 3rd May 2020
- Phase 5 - Conditional Movement Control Order (CMCO) from 4th till 11th May 2020
- Phase 6 - Conditional Movement Control Order (CMCO) from 12th May 2020 till 9th June 2020
- Phase 7 - Recovery Movement Control Order (RMCO) from 10th June till 31st August 2020

Nevertheless, Malaysia is facing the second and third wave of Covid-19 starting from Sabah and few states as below:

- Phase 8
- Recovery Movement Control Order (RMCO, all states) from 1st September till 31 December 2020
- Conditional Movement Control Order in Selangor, Kuala Lumpur and Putrajaya from 14th October till 6th December 2020
- Conditional Movement Control Order in Kedah, Penang, Perak, Negeri Sembilan, Malacca, Johor, Terengganu from 9th November till 6th December 2020
- Conditional Movement Control Order in Sabah from 13th October till 6th December 2020
- Conditional Movement Control Order in Labuan from 17th October till 6th December 2020

(source: Flanders Trade, 2020)

Malaysia has been free from the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infection since January 2018. The health ministry had conducted prevention and control activities at all levels to curb the spread of the MERS-CoV infection. However, on 30th January 2020, the World Health Organization (WHO) declared COVID-19 a public health emergency of international concern (WHO, Feb 25, 2020). Surprisingly, in the first week of March, a number of shocking new cases reported globally, and COVID-19 appeared as an

epidemic. On March 12, 2020, there were more than 125,000 confirmed cases in 118 countries, and more than 4600 deaths were reported (WHO, March 13, 2020).

The Malaysian Health Ministry has informed that as of 9th Oct 2020, Malaysia is currently on the move towards the third wave of COVID-19 and the total cases are 51,680 as of 11th November 2020. The third wave has resulted in 326 death cases, 13,222 cases of hospitalization, and 38,132 recovered cases. The cases kept increasing drastically since 2nd October 2020 due to local transmissions. The increasing numbers of cases are contributed largely from Sabah and Sarawak in East Malaysia. Moreover, Sabah and Sarawak have accumulated the total cases of 18,083 and 942 respectively, where it triggers anxiety among Malaysian as the number shows 50% out of total cases in Malaysia as of 5th November 2020. The surge in COVID-19 was also due to the state election in Sabah which has taken place for two weeks and the cluster first erupted at a detention centre in Sabah that housed illegal immigrants from Indonesia and Philippines.

COVID-19 is spread by human-to-human transmission through droplet, fecal-oral, and direct contact and has an incubation period of 2-14 days (KKM, March 13, 2020). Currently, no antivirus or vaccine has been confirmedly recommended for this disease. The WHO and Malaysia Ministry of Health have also strengthened the strategies and information in preventing COVID-19. Accordingly, the COVID-19 epidemic offers an exclusive change to students' level of knowledge, attitude and practices during this global health crisis.

Meanwhile, the Ministry of Health has detected that two students from Sultan Idris Education University (UPSI) and three from Universiti Malaysia Sabah (UMS) are positive COVID-19. The students were suspected to have exposed to employees who enter the campus or café. All of the students in both universities were isolated for four weeks for health screening and not a COVID-19 detection test unless they showed the symptoms (Rafidah & Yusri, 2020, May 14). Furthermore, on May 11, Sabah has recorded a sudden increase in new cases of positive COVID-19. The UPSI students are prohibited to return to their hometown in order to allow the government in implementing proper COVID-19 screening process. There were three positive cases involving students at University of Sarawak (UNIMAS). On March 30, a victim aged 23 years old was admitted to the ICU ward of Sarawak General Hospital due to breathing problem and was pronounced dead on the same day. The parents of the victims have also been confirmed positive for COVID-19 (M. Roji Kawi, 2020, April 9). Meanwhile, a student from International Islamic University of Malaysia has been found positive COVID-19 after a regular screening procedure held at the university. The student has been taken to the Sungai Buloh Hospital for treatment and overall, it was under control. More precautionary and preventive actions have been taken due to this issue (Esther Landau, 2020, Oct 31). The number of cases is increasing from time to time and therefore, it is important to know students' knowledge of COVID-19 and how this affects their attitudes and practices in preventing this pandemic.

This pandemic has indeed changed the habits that have become the practice of many, so that we need to adapt to the "new normal". It is not an easy thing, but over time it will become habits. A poor understanding and lack of knowledge on COVID-19 issue especially to students may contribute to delayed treatment and the rapid spread of infection. Therefore, this study aimed to investigate students' knowledge, attitude, and practices towards COVID-19 pandemic at this critical time.

LITERATURE REVIEW

The Knowledge, Attitudes, and Practices framework

Knowledge, attitudes, and practices or "KAP theory" is "a health behaviour change theory" which proposed by scholars in western countries around 1960s (Ross & Smith, 1969). This theory shows the "progressive relationship between knowledge, attitudes, and behaviour" (practices) as follow: a) knowledge is basis of behaviour change and b) beliefs and attitudes are the driving factors of behaviour change. For example, in order to prevent the COVID-19 disease, it is important for people who are suffering from high blood pressure, diabetes, kidney failure etc. to strictly adhere the advice of 3W (Wash, Wear, Worn) and 3C (avoid Crowded places, Confined spaces, Close conversation). However, people's or student's observance will be mostly influenced by their knowledge, attitude, and practices. This is also compliance to the "KAP" theory wherein people's behaviours are divided into three important processes such as the need for correct knowledge, attitude and the adoption of practice or behaviour (Fan, Zhang, Li Yan, Li Yuelu, Zhang, Liu et. al., 2018). Many studies have proven that the knowledge, attitudes, and practices level is correlated to people's prevention and management to one's own health. In contrast, deficiencies in knowledge, attitudes, and practices are associated with poor health and maladaptive disease prevention behaviour. Therefore, it is expected that the knowledge, attitude, and practices' level will be a determining factor in combating COVID-19. Hence, the study was conducted to investigate students' knowledge, attitude and practices regarding COVID-19 pandemic.

Knowledge

A study that has been conducted in China regarding COVID-19 through WeChat survey showed that overall respondents' knowledge is good (more than 82% of respondents' answers were correct). Most of them responded that only "infected patients must have symptoms", and "there are no asymptomatic infections" and "COVID-19 infection has high mortality" need to be repeated and educated among the public. Moreover, most of them claimed that in preventing this pandemic, they have chosen the correct type and proper use of face masks, always have proper handwashing, and keeping their indoor environment clean and well ventilated (Martin Guo, 2020).

Another study by Akshaya, Wafa, Jamal, Mohammadjavad and Deepak (2020) showed that most health workers (86%) in United Arab Emirates (UAE) have good knowledge of covid-19. They claimed that "maintaining hand hygiene, covering the nose and mouth while coughing, and avoiding sick patients could help to prevent COVID-19 transmission". Martin Guo (2020) also discovered that 39% of respondents suggested that "relatives, friends or contacts were confirmed or suspected cases of COVID-19, and 29% were living in/had been to Wuhan and/or five other major outbreak cities". Hence, the study reported that respondents had a better understanding of this pandemic with the adaptation of more detailed prevention and management. Truly, the respondents have more time on studying epidemic knowledge and paid greater attention to individuals and families. He also added in his study that 65% of respondents paid more attention to pandemic information where on average spend about two hours per day in order to obtain the appropriate information. They received the information more than 90% from the official media, professional media, and government online platforms which were more trusted and reliable. However, 6% of respondents relied their information on relatives and friends on social media.

Attitude

The overwhelming majority of the respondents also reflected a positive and enthusiastic attitude towards the COVID-19. Zhong, Luo, Li, Zhang, Liu, Li WT, and Li Y (2020) in their study in China showed that 90.8% of the respondents believed that COVID-19 will be effectively controlled and 97.1% had confidence that China will win the conflict against this virus. Mahmoud E. Elrggal et. al., (2018) also mentioned that majority of the participants' have high attitude where they strongly agreed that educating people about MERS is important in preventing the disease from spreading. Additionally, half of the participants strongly agreed to not doing their check-up rotation in a hospital without a clear MERS infection control isolation policy. They added that people with high knowledge will have a high positive attitude in fighting the epidemic. A significant relationship had been identified between study discipline (attitude) and mean knowledge score (p<0.0001) in their study.

Practices

Regardless of this, the practices of the respondents were being extremely careful in avoiding crowded places (96.4%) and always wear masks in public (98%) during the outbreak. Martin Guo (2020) also claimed that 19% to 72% of respondents started to wear face masks and 30% to 47% wash hands more often about 7 to 10 times or more. Moreover, 10% to 54% of respondents used disinfection products for example bleaching powder, washing detergent, UV lamps, etc. The ratio of taking preventative measures has increased to a higher level ever since. Additionally, these results are similar to previous studies during the Severe Acute Respiratory Syndrome (SARS) pandemic. Majority of the respondents in China believed that SARS can be effectively monitored or prevented and most of the respondents had confidence that China can win the pandemic against SARS (Zhou, Xiu & Chu, 2004; Liu, Gao & Zhang, 2004).

Thus, the researchers would like to investigate the relationship between knowledge and attitude as below:

H1: Students' knowledge of COVID-19 has a positive and significant effect on practices
H2: Students' attitude of COVID-19 has a positive and significant effect on practices
H3: Students' knowledge of COVID-19 has a positive and significant effect on attitudes

METHODOLOGY

Sample and Statistical Procedure

A cross-sectional, online survey was conducted randomly among undergraduate students during the first week of April 2020. There are about 3,000 full-time students in UiTM Rembau (Student Information Management System, 2020). A size of 384 respondents as a sample should be an appropriate minimum for this population (Krejcie and Morgan, 1970). The researcher used simple random sampling technique where every member in the population has an equal chance being selected for this study. All students from three faculties were given a link by the respective coordinator programmes through WhatsApp group. The data collection process took about two months. In total, 610 online questionnaires were administrated via Google form during the study. The data were coded, entered, and analysed using SPSS version 23. The researcher used descriptive analysis to measure the sum, percentage, mean and standard deviant. Meanwhile, a correlation analysis was also conducted to measure the relationship between knowledge, attitude, and practices among students.

Instruments and reliability

The instruments used were adapted from past research studies on knowledge, attitudes, and practices of COVID-19 and past literature review. A 22-item survey instrument was adopted and distributed online to undergraduate students. The questions also included demography items. Respondents were asked about a) source of information b) knowledge of COVID-19-affected patients, c) attitudes of COVID-19, and d) practices of COVID-19. Table 1 shows the allocation of instruments, items, and the reliability test. The instruments were adopted by Akshaya et al., (2020) Mahmoud E. Elrggal et al., (2018), and Zhong BL et al., (2020). The items used four Likert scales and yes and no (binary data)

Before the questionnaires were distributed to the students, researchers will seek help from the experts to confirm that the items of an assessment or instrument are appropriate to the targeted study and objectives. The pre-test had been conducted among 30 Diploma students. Kruder-Richardson 20 (KR20) was used to measure the reliability test when dealing with the dichotomous (binary) data such as Yes = 1, No = 0. Meanwhile, Cronbach's alpha was used to measure the reliability of attitude and practice. The results of the reliability analysis were presented in Table 1 to show that the reliability test is meet after some adjustments or reworded have been made to avoid misunderstanding when the respondents attempted the questionnaire.

Table 1: Allocation of instrument, questions, and reliability

Instrument	Source	No of Item/ questions	Cronbach's alpha Pre-Test (n=30)	Mean (SD)	Cronbach's alpha Field Test (n=610)	Mean (SD)
Knowledge	Akshaya et al., (2020)	8 (Yes/No)	KR20 =.71	6.46 (5.95)	KR20=.85	6.84 (6.32)
Attitudes	Mahmoud E. Elrggal et al., (2018)	5 (Likert Scale)	.84	18.23 (2.27)	.76	17.55 (2.59)
Practices	Zhong BL et al., (2020).	2 (Likert Scale)	.74	6.3 (.79)	.83	6.16 (.66)

FINDINGS

The descriptive statistics are shown in Table 1. Overall, male students stated 150 and female 460. Most of the age range was between 20 to 22 (61%), followed by age 18-19 (34%). Most of the students were among the Diploma programme (82%) and majority were in the second year. Meanwhile, the Communication and Media Studies programme stated the highest response 56% as compared to Business Management (23%) and Information Management (21%).

Majority of them have heard about COVID-19 (99%) and only 28% of them had the opportunity to attend lectures/discussions on COVID-19 issue. Meanwhile, more than half of the undergraduate students (60%) reported that the primary sources of information were obtained from online news and social media (97%), while (96%) cited TV or radio (96%) and (70%) cited government official website. Furthermore, nearly 62% of the respondents discussed this topic with friends and family, gaining knowledge through lectures in college (28%), posters and brochures (23%), and seminars (1%).

Table 2: Demographics and characteristics of students (n=610)

Item		Frequency (%)
Gender	Male	460 (75)
	Female	150 (25)
Age	<19	206 (34)
	20-22	377 (61)
	23-25	24 (4)
	>26	3 (1)
Program	Diploma	501 (82)
	Degree	109 (18)
Faculty	Communication and Media Studies	341 (56)
	Business Management	137 (23)
	Information Management	132 (21)
Years of study	Year 1	168 (27)
	Year 2	375 (62)
	Year 3	67 (11)
Heard about COVID-19	Yes	607 (99)
	No	3 (1)
Source of knowledge about COVID-19	Lecture in college	172 (28)
	TV or radio news	586 (96)
	Newspaper	101
	Online news	590 (97)
	Friends/family	382 (62)
	Posters and brochures	158 (23)
	Social media	589(97)
	Seminar	7 (1)
	Official government website	429 (70)

Table 2 shows students' knowledge of COVID-19 according to the highest mean. Students' knowledge of COVID-19 was measured by eight questions (K1-K8, Table 2). Majority of the students have high correct answers when asked about their knowledge of COVID-19. Students of Mass Communication and Media Studies (FKPM) and Information Management (FPM) have responded with almost all correct answers (99%) respectively as compared to Business Management (FPP) (95%). Most of them were aware that avoiding close contact with infected people and crowded places can help to prevent COVID-19 transmission.

Meanwhile, students of FPM (98%) cited headache, fever, cough, sore throat, and flu are symptoms of COVID-19 as the correct answers, followed by FKPM (95%) and FPP (92%). Students of all programmes have answered correctly for the third question between 88% to 92% that COVID-19 leads to pneumonia, respiratory failure, and death. The fourth question indicated that the incubation period of COVID-19 will take place between two to 14 days and majority responded with correct answers especially to FPM (94%), followed by FPP (91%) and FKPM (89%).

Two third of the students responded with the correct answers to question five "supportive care is the current treatment for COVID-19". However, half of the students in all programmes responded with the moderate correct answer for question six as FPM stated 65%, FPP (53%) and FKPM (52%) in maintaining good hand hygiene, covering nose and mouth while coughing, and social distancing can help in the prevention of COVID-19. Next, two-third of the respondents for all programmes answered moderate correct responses for question seven (69% to 72%) when asked regarding COVID-19 pandemic that can be transmitted through air, contact, and droplets. The results for the last question also indicated quite low responses for the correct answers (53% to 62%) that sick patients should share their recent

travel history with healthcare providers. Overall, more than half of the students reported better knowledge scores for question one to four and moderate for question five to eight.

Table 3: Students' knowledge of COVID-19, n = (%)

Item	Communication and Media (n=341) (FKPM)	Business Management (n=137) (FPP)	Information Management (n=132) (FPM)	Total Correct Responses	Mean	SD
K1. Avoiding close contact with infected people and crowded places can help preventing the COVID-19 transmission	337 (99%)	130 (95%)	130 (99%)	597 (98%)	**.96**	.27
K2. Headache, fever, cough, sore throat, and flu are symptoms of COVID-19	325 (95%)	126 (92%)	129 (98%)	580 (95%)	.92	.37
K3. COVID-19 leads to pneumonia, respiratory failure, and death	311 (91%)	121 (88%)	121 (92%)	553 (91%)	.83	.55
K4. The incubation period of COVID-19 (2-14 days)	304 (89%)	125 (91%)	124 (94%)	553 (91%)	.83	.55
K5. Supportive care is the current treatment for COVID-19	304 (89%)	104 (76%)	120 (91%)	528 (87%)	.74	.66
K6. Hand hygiene, covering nose and mouth while coughing, and social distancing can help in the prevention of COVID-19	178 (52%)	72 (53%)	86 (65%)	520 (85%)	.73	.65
K7. COVID-19 is transmitted through air, contact, droplets	237 (69%)	101 (74%)	98 (72%)	436 (71%)	.58	.71
K8. Sick patients should share their recent travel history with healthcare providers	215 (63%)	73 (53%)	85 (62%)	373 (61%)	.54	.49

Students' attitudes towards COVID-19 were measured by five questions (A1-A5, Table 3). Majority of the participants (70%) strongly agreed that currently, COVID-19 is a serious public health issue, while 71% reported that COVID-19 symptoms need more time and special treatment to cure. Most of them (84%) reported that educating people regarding COVID-19 is important in preventing this disease. Furthermore, half of the participants (51%) strongly disagreed with not doing a clinical rotation in a hospital regardless of COVID-19 patients in the hospital. Meanwhile, 50% agreed that they will not do their clinical rotation in a hospital without a clear COVID-19 control isolation policy. Meanwhile, the questions for students' practices were composed of two behaviors (P1-P2, Table 3). Most of the respondents confirmed that so far, they did not go to any crowded places (95%) and 90% confirmed that they always wear face masks outside their home.

Table 4: Students' attitude and practices towards COVID-19, n= (%)

Item	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	SD
A1. Educating people about COVID-19 is important to prevent the spread of the disease	16 (3%)	20 (3%)	63 (10%)	511 (84%)	**3.75**	3.28
A2. I believe COVID-19 is not currently a serious public health issue	425 (70%)	150 (25%)	20(3%)	15 (2%)	3.61	3.15
A3. COVID-19 symptoms often resolve with time and do not require any special treatment	430 (71%)	130 (21%)	30 (5%)	20 (3%)	3.59	3.14
A4. I will not do my clinical rotation in a hospital without a clear COVID-19 infection control isolation policy	15 (2%)	24 (4%)	305 (50%)	266 (44%)	3.34	2.88
A5. I will not do my clinical rotation in a hospital where COVID-19 patients are treated	311 (51%)	169 (28%)	109 (18%)	21 (3%)	3.26	2.85
P1. In recent days, I have always worn a mask when leaving home	9 (2%)	18 (3%)	33 (5%)	550 (90%)	**3.84**	3.35
P2. In recent days, I have not gone to any crowded place	13 (2%)	20 (3%)	327 (54%)	250 (41%)	3.33	2.86

Table 5: Results of Pearson Correlation Coefficient between students' knowledge, attitude, and practice of COVID-19

Item: Knowledge (K), Attitude (A)	P1. Students' practices		A1. Students' attitudes	
	r	P value	r	P value
K1. Avoiding close contact with infected people and crowded places can help preventing the COVID-19 transmission	.147	.035*	.101	.045*
K6. Hand hygiene, covering nose and mouth while coughing, and social distancing can help in the prevention of COVID-19	.124	.040*		
A1. Educating people about COVID-19 is important to prevent the spread of the disease	.347	.002**		
A3. COVID-19 symptoms often resolve with time and do not require any special treatment	.204	.029*		
A4. I will not do my clinical rotation in a hospital without a clear COVID-19 infection control isolation policy	.634	.000**		
A5. I will not do my clinical rotation in a hospital where COVID-19 patients are treated	.620	.000**		

*p<0.05, **p<0.001

The relationship between students' knowledge and practice have been identified by using the Pearson Correlation. The results from table 5 showed that there was a positive and significant relationship between item K1, K6 (p<.05) and students' practice (P1). However, the r values for K1 (r=.147) and K2 (r=.124) showed very low correlation. Meanwhile, attitude showed strong positive and significant relationship between A1, A3, A4 and A5 (p<.05, p<.001). The r values for A4 (r=.634), A5 (r=.620) indicated moderate correlation. However, A1 (r=.347) and A3 showed (r=.204) reported low correlation. Lastly between knowledge and attitude, the result showed that only one item is correlated (A1) but the r values (r=.101) indicated very little relationship. In achieving the goal of the analysis, the Guilford's rule of

thumb was used to understand degree, size, strength, and magnitude of relationship of Pearson Correlation Coefficient (r). Below are the details:

    r=0.00-0.29 (Little or negligible relationship)
    r=0.39-0.49 (Low relationship)
    r=0.50-0.69 (Moderate or marked relationship)
    r=0.70-0.89 (High relationship)
    r=0.90-1.00 (Very high relationship)

DISCUSSION

The study shows that overall, the undergraduate students have good knowledge and attitude concerning the COVID-19 pandemic. Majority of the students cited that online news, social media, TV or radio news, and government official websites are their main sources of information for COVID-19. The increased number of students using the Internet to seek information is supported by Al-Mohrej et al. (2017) in Arab Saudi that is related to a program on students' awareness of Middle East respiratory syndrome coronavirus. Meanwhile, Baseer et al., (2016) also stressed that the Ministry of Health in Saudi Arabia often uploaded educational programs such as infection control on its portal. It is effective for the public to get the latest information safely, clearly, and fast. However, information on COVID-19 delivered through lectures or seminar is also important in creating awareness as it should be taught before the pandemic arise.

Majority of the students have correctly responded that avoiding close contact with infected people and crowded places can help to prevent the COVID-19 transmission. Memish et al., (2013a, p.4) also supported that the "role of overcrowding of patients in initiating a potential MERS outbreak particularly in hospitals within adequate infection control measures was also highlighted in a previous study". The adequate hand hygiene was also mentioned in previous studies in the prevention of MERS and COVID-19. Brug et at. (2004) in their studies claimed that lack of proper hand hygiene can increase the risk of infection. The use of face masks was also proven in preventing COVID-19 and MERS. Besides that, avoiding crowded places is highly supported by the previous research on MERS and COVID-19 (Memish et al., 2013a & Zhong BL et al., 2020).

Over half of the students mentioned that they would not do their clinical rotation in a hospital without a clear COVID-19 infection control isolation policy. This finding is supported by Butt et al., (2016) in their study on the awareness of pathogen transmission. Meanwhile, it is proven that the transmission of COVID-19 infection from infected patients to the public has also been confirmed by Assiri et al., (2013) and Memish et al. (2013a, b) in their studies on MERS. Moreover, the optimistic attitude among the students regarding COVID-19 helps the students to have better practices where most of them avoid crowded places and always wear face masks when going outdoors. These can be proven with the results of the strong and positive relationship between attitude and practices. "This correlation was supported by the Theory of Reasoned Action (TRA) in which it confirmed that a person aimed is to bring out specific behaviour based on their attitude towards behaviour" (Fisher, Fisher & Rye, 1995).

Generally, most participants had positive knowledge, attitudes, practices, and control of COVID-19 in Malaysia as most of the students follow or aware of the information that has been posted by the Malaysia Ministry of Health especially on the COVID-19 guidelines or Standard Operating Procedure (SOP) in handling this disease such as "banning public gatherings". These guidelines have also clearly outlined the isolation procedures and precautions for the control of COVID-19 infection (KKM, 2020). This is in compliance with the

"KAP theory" which stated that changes in human practice or conduct is a "step-wise process" that requires the achievement of knowledge, attitudes and finally the adoption of practice (Fan, Zhang, Li Yan, Li Yuelu, Zhang, Liu et. al., 2018). In addition, students with high personal knowledge will adapt a positive change in behaviour.

CONCLUSION

Overall, UiTM students in Rembau campus reflected positive knowledge, attitudes, and practices towards the COVID-19 pandemic. Thus, they were able to contribute to good practices that are effective in battling the pandemic. Additionally, students with excellent knowledge of COVID-19 are associated with optimistic attitudes with appropriate practices, indicating that health education or information programs aimed at enhancing COVID-19 knowledge will be useful in fostering an optimistic attitude and keeping secure practices. The good knowledge of COVID-19 among students has resulted in high mean for attitude and practices (highest mean= 3.84 for P1, followed by A1= 3.75 and the lowest mean A5= 3.26) as shown in table 4. As COVID-19 continues to emerge, educational campaigns should be promoted and taught to students as well as the community. Educational interventions are urgently needed to reach 100% awareness, attitude, and prevention in future planning. It is valuable mentioning that the higher knowledge scores of COVID-19 among students, were associated with a higher understanding of preventive measures against the COVID-19 pandemic. Meanwhile, it is reported that the number of students with negative attitudes was represented very minimally. These findings evidently projected that the importance of enhancing students' knowledge on COVID-19 should be highlighted to boost the improvements of their attitudes towards the pandemic. This can possibly be achieved through health education via television or radio news, online news, social media, government website etc. which is believed to be an effective medium for knowledge propagation. It is hoped that the students can act as one of the catalysts in disseminating the information especially through virtual means and in the same breath, it is also anticipated that the public, Ministry of Health, and Ministry of Defend will work together to triumph the battle against COVID-19 at present and in the future.

REFERENCES

Al-Mohrej A & Agha S (2017). Are Saudi medical students aware of middle east respiratory syndrome coronavirus during an outbreak? *Journal of Infection Public Health*, 10, 388–395. Retrieved from https://doi.org/10.1016/j.jiph.2016.06.013

Akshaya Srikanth Bhagavathula, Wafa Ali Aldhaleei, Jamal Rahmani, Mohammadjavad Ashrafi Mahabadi & Deepak Kumar Bandari (2020). Novel Coronavirus (COVID-19) Knowledge and Perceptions: A Survey of Healthcare Workers. Retrieved from https://doi.org/10.1101/2020.03.09.20033381.

Assiri A, Mc Geer A, Perl TM, Price CS, Al Rabeeah AA, Cummings DA, Alabdullatif ZN, Assad M, Almulhim A, Makhdoom H,Madani H, Alhakeem R, Al-Tawfiq JA, Cotten M, Watson SJ,Kellam P, Zumla AI & Memish ZA (2013) Hospital outbreak of Middle East respiratory syndrome coronavirus. *New England Journal of Medicine*, 369, 407–416. https://doi.org/10.1056/NEJMoa1306742

Babbie (2007). *The Practice of Social Research.* (11th edition). Belmont, CA: Thomson Wadsworth.

Baseer MA, Ansari SH, AlShamrani SS, Alakras AR, Mahrous R, & Alenazi AM (2016) Awareness of droplet and airborne isolation precautions among dental health professionals during the outbreak of coronavirus infection in Riyadh city, Saudi Arabia. *Journal section: Community and Preventive Dentistry* 8(4):e379–e387. https://doi.org/10.4317/jced.52811

Brug J, Aro AR, Oenema A, de Zwart O, Richardus JH & Bishop GD (2004) SARS risk perception, knowledge, precautions, and information sources, the Netherlands. *Emerging infection Disease* 10:1486–1489. https://doi.org/10.3201/eid1008.040283

Butt TS, Koutlakis-Barron I, AlJumaah S, AlThawadi S, & AlMofada S (2016) Infection control and prevention practices implemented to reduce transmission risk of Middle East respiratory syndrome coronavirus in a tertiary care institution in Saudi Arabia. *Am J Infect Control,* 44, 605–611. https://doi.org/10.1016/j.ajic.2016.01. 004

Chen S, Qiu Z, Xu L, Chen J, Lin Y, Yang Y. et al. (2003). People groups' responses to SARS in the community. *Chinese Rural Health Service Administration*, 23, 15-8

Elrggal, M.E., Karami, N.A., Rafea, B. *et al.* (2018) Evaluation of preparedness of healthcare student volunteers against Middle East respiratory syndrome coronavirus (MERS-CoV) in Makkah, Saudi Arabia: A cross-sectional study. *Journal of Public Health*: *From Theory to Practice*, 26, 607–612. https://doi.org/10.1007/s10389-018-0917-5

Esther Landau (2020, Oct 31). Student at IIUM tests positive for Covid-19. Retrieved from https://www.nst.com.my/news/nation/2020/10/636876/student-iium-tests-positive-covid-19

Fisher WA, Fisher JD & Rye BJ (1995) Understanding and promoting AIDS-preventive behaviour: insights from the theory of reasoned action. *Health Psychology,* 14(3), 255.

Fan Y, Zhang S, Li Y, Li Y, Zhang T, Liu W & Jiang, H., (2018). Development and psychometric testing of the Knowledge, Attitudes and Practices (KAP) questionnaire among student Tuberculosis (TB) Patients (STBP-KAPQ) in China. BMC Infect Dis. 18(1). Retrieved from http: 10.1186/s12879-018-3122-9

Kementerian Kesihatan Malaysia (2020, April 10). Retreived from https://www.moh.gov.my /moh/resources/Keratan%20Akhbar/2020/April/Keratan_Akhbar_16.4_.2020_.pdf 16(10):1745-1752. doi:10.7150/ijbs.45221.

Krejcie, R.V. & Morgan D.W. (1970). Determining sample size for research activities. *Educational and Psychological Measurements*, 30, 607-10

Liu Z, Gao H & Zhang S (2004). Prevention and treatment knowledge towards SARS of urban population in Jinan. *Preventive Medicine Tribune*; 10, 659-60.

Martin Guo (2020) Examining the Chinese public's awareness and reaction to the coronavirus. Retrieved from https://us.kantar.com/business/health/2020/health-awareness-and-behaviors-during-covid-19-epidemic/

Memish ZA, Zumla AI, Al-Hakeem RF, Al-Rabeeah AA, & Stephens GM (2013a) Family cluster of Middle East respiratory syndrome coronavirus infections. *New England Journal of Medicine,* 368,2487–2494. https://doi.org/10.1056/NEJMoa1303729

Memish ZA, Zumla AI & Assiri A (2013b) Middle East respiratory syndrome corona virus infections in health care workers. *New England Journal of Medicine* 369:884–886. https://doi.org/10.1056/NEJMc1308698

M. Roji Kawi (2020, April 9) Pelajar UNIMAS korban ke-13 COVID- 19 Sarawak. Retrieved from https://www.bharian.com.my/berita/nasional/2020/04/675059/pelajar-unimas-korban-ke-13-covid-19-sarawak

Mohd Amirul Akhbar (2020, April 19). Nyahkan Pendidikan lapuk berasaskan peperiksaan. MalaysiaKini. Retrived from https://www.malaysiakini.com/news/521392

Rafidah & Yusri (2020, May 14). COVID-19: 5 pelajar universiti dikesan positif. Retrieved from https://www.bharian.com.my/berita/nasional/2020/05/688870/covid-19-5-pelajar-universiti-dikesan-positif

Ross J, Smith DP (1964) Korea-trends in 4 National Kap Surveys, 1964-67. *Studies in Family Planning*, 43, 6–11.

World Health Organization (2020, February 25). Retrieved from https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health- regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)

World Health Organization (2020, March 13). Novel coronavirus (COVID-19) situation. Retrieved from https://experience.arcgis.com/experience/685d0ace521648f8a5beeeee1b9125cd

Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, Li Y (2020) Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *International Journal of Biology Science* Retrieved from http://www.ijbs.com/v16p1745.htm

Zhou X, Xiu C, Chu Q (2004). Prevention and treatment knowledge and attitudes towards SARS of urban residents in Qingdao. *Preventive Medicine Tribune*, 10, 407-8.