KNOWLEDGE ON COVID-19 AND PRACTICE TOWARDS PREVENTION OF COVID-19 AMONG UNDERGRADUATE STUDENTS IN HEALTH CAMPUS UNIVERSITI SAINS MALAYSIA

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by

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LIST OF ABBREVIATIONS

$\bar{x}$	-	Mean
ARDS	-	Acute Respiratory Distress Syndrome
CDC	-	Centre for Disease Control and Prevention
COVID-19	-	Coronavirus Disease 2019
HBM	-	Health Belief Model
HFNO	-	High-Flow Nasal Oxygen
MCO	-	Movement Control Order
MERS-CoV	-	Middle East Respiratory Syndrome-Related Coronavirus
MOH	-	Ministry of Health
NIV	-	Non-Invasive Ventilation
pH	-	Potential of Hydrogen
SARS-CoV	-	Severe Acute Respiratory Syndrome-Related Coronavirus
SARS-CoV-2	-	Severe Acute Respiratory Syndrome Coronavirus 2
SD	-	Standard Deviation
SOP	-	Standard Operating of Procedure
SPSS	-	Statistical Package for Social Science
PHEIC	-	Public Health Emergency of International Concern
WHO	-	World Health Organization

PENGETAHUAN TENTANG COVID-19 DAN AMALAN TERHADAP PENCEGAHAN COVID-19 DIKALANGAN PARA PELAJAR SARJANA DI KAMPUS KESIHATAN UNIVERSITI SAINS MALAYSIA

ABSTRAK

COVID-19 merupakan penyakit berjangkit yang disebabkan oleh coronavirus yang baru dijumpai dan menyebabkan banyak kesan seperti meningkatkan kadar kematian terutama bagi orang tua dan mendatangkan masalah kewangan bagi sistem kesihatan. Kajian keratan rentas telah dijalankan bertujuan untuk menentukan pengetahuan pelajar mengenai COVID-19 dan amalan pencegahan COVID-19 di Kampus Kesihatan USM. Kajian ini juga mengkaji hubungan antara pengetahuan mengenai COVID-19 dan amalan pencegahan COVID-19 dikalangan para pelajar sarjana di Kampus Kesihatan USM. *Fisher Exact Test* digunakan untuk menentukan hubungan antara pengetahuan mengenai COVID-19 dan amalan pencegahan COVID-19. Seramai 273 pelajar sarjana, 128 pelajar berasal dari Sekolah Sains Perubatan, 56 pelajar dari Sekolah Sains Pergigian dan 97 pelajar dari Sekolah Sains Kesihatan telah direkrut melalui persampelan berstrata. Pengumpulan data telah dijalankan dari November 2020 hingga Jun 2021 menggunakan *google form* dan dianalisis menggunakan SPSS versi 26.0 untuk *Window*. Majoriti responden adalah pelajar perempuan (78.4%). Hasil kajian menunjukkan bahawa pelajar sarjana di Kampus Kesihatan USM mempunyai tahap pengetahuan yang tinggi ($\bar{x}$= 23.139, SD = 1.498) mengenai COVID-19. Sementara untuk tahap amalan, pelajar didapati mempunyai amalan yang sederhana baik untuk pencegahan COVID-19 ($\bar{x}$= 30.059, SD = 3.032). Tidak ada hubungan antara pengetahuan mengenai COVID-19 dan amalan terhadap pencegahan COVID-19 (p = 1.000). Hasilnya menunjukkan hanya 127 (46.52%) bagi responden yang mempunyai pengetahuan yang tinggi dan amalan yang baik. Kesimpulannya, tahap amalan pencegahan COVID-19 perlu

ditingkatkan di kalangan pelajar sarjana supaya mereka akan lebih praktikal dalam mencegah COVID-19.

KNOWLEDGE ON COVID-19 AND PRACTICE TOWARDS PREVENTION OF COVID-19 AMONG UNDERGRADUATE STUDENTS IN HEALTH CAMPUS UNIVERSITI SAINS MALAYSA

ABSTRACT

COVID-19 is an infectious disease caused by a newly discovered coronavirus and causes many effects such as increased risk of mortality especially for elderly and financial constraint for health care system. A cross-sectional study has been conducted to determine students' knowledge on COVID-19 and practice towards prevention of COVID-19 in Health Campus USM. This study also examined the relationship between knowledge on COVID-19 and practice towards prevention of COVID-19 among undergraduate students in Health Campus USM. Fisher Exact Test was used to determine the relationship between knowledge on COVID-19 and practice towards prevention of COVID-19. A total of 273 undergraduate students, 128 students were from the School of Medical Science, 56 students from the School of Dental Science and, 97 students from the School of Health Science were recruited through stratified sampling. Data were collected from November 2020 until June 2021 using google form and analyzed using SPSS version 26.0 for a window. Most of the respondents are female students (78.4%). The results revealed undergraduate students in Health Campus USM were having a high knowledge level ($\bar{x}$=23.139, SD=1.498) regarding COVID-19. Meanwhile, for the level of practice, students were found to be having moderately good practice towards the prevention of COVID-19 ($\bar{x}$=30.059, SD=3.032). There was no relationship to be found between knowledge on COVID-19 and practice towards the prevention of COVID-19 (p=1.000). The results show only 127(46.52%) respondents who have high knowledge and good practice. In conclusion, the level of the practice needs

to be increased and improved among undergraduate students so that they are more practical in preventing COVID-19.

CHAPTER 1

INTRODUCTION

This first chapter gives the background of the study that the research was conducted. Furthermore, the researcher has also explained in this chapter the reason to conduct this study among university students in Health Campus, Universiti Sains Malaysia. In addition, researcher has also listed some objectives and benefits of conducting this study.

1.1 Background of the Study

According to World Health Organization (2020a), the first human cases of a severe coronavirus-2 syndrome (SARS-CoV-2) were reported in Wuhan City, China in December 2019. In early December 2019, retrospective investigations by Chinese authorities reported human cases with the onset of symptoms (WHO, 2020b). While some of the earliest known cases had a link in Wuhan to a wholesale food market, some did not, many of the initial patients were either stall owners, market employees, or regular visitors to this market (WHO, 2020b). In January 2020, WHO declared the outbreak a Public Health Emergency of International Concern (PHEIC) (WHO, 2020d). This disease spread rapidly to other countries including South Korea, Taiwan, Thailand, Singapore, Japan, Italy, Iran, Spain, USA, and UK (Elengoe, 2020). After that on 11 March 2020, WHO declared that COVID-19 can be characterized as a pandemic (WHO, 2020c).

The latest report on 4th June 2021, there are a total of 171,782,908 cases of COVID-19 and 3,698,621 cases of deaths recorded throughout the world (WHO, 2021). The United States of America (USA) had the highest number of cases of COVID-19 which is 33.4 million and the number of deaths is 596K (WHO, 2021). While in Malaysia, last updated on 4th June 2021 recorded that there were 603,122 COVID-19 cases including

3,182 deaths and 515,571 cases of recovery reported by the Director-General of Health Malaysia Tan Sri Doctor Noor Hisham Abdullah (KKM, 2021). MOH informed that from 24th May 2021 to 4th June 2021, a total of 19 cases of new variants of SARS-CoV-2 virus were reported which are all Variants of Concern (VOC) namely four cases of Delta variant (B.1.617.2) and 15 cases of Beta variant (B.1.351). Covid-19 VOCs or variants of concern are when they can cause rapid transmission of infection, lack of vaccine protection effectiveness and, difficulty detecting infection (KKM, 2021). As of 4 June 2021, for 15 new cases of the Beta variant (B.1.351) formerly known as the South African variant, a total of five cases were recorded in Kelantan, six cases in Johor, and one case each in the Federal Territory of Kuala Lumpur, Kedah, Melaka, and Terengganu. According to the MOH, all cases are local infections (KKM, 2021).

The symptoms of COVID-19 typically manifest as fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle aches, headache, loss of taste, sore throat, congestion or runny nose, nausea or vomiting, and diarrhea (CDC, 2020). Serious pneumonia, organ failure such as kidney, acute respiratory tract, and septic shock, which may lead to death can occur in some COVID-19 patients (Huang et al., 2020). However, some infected people are asymptomatic carriers who do not develop any symptoms and do not feel unwell (Elengoe, 2020).

Transmission of COVID-19 is spread by large droplets formed by symptomatic patients while coughing and sneezing-but may occur from asymptomatic individuals and before the onset of symptoms (Rothe et al., 2020). This study also states that higher viral loads are detected in the nasal cavity as compared to the throat (Bhat et al., 2020). In addition, these infected droplets can be spread one to two meters and deposited on the surface (Singhal, 2020). In favorable atmospheric conditions, the virus will remain viable for days on the surface, but common disinfectants such as sodium hypochlorite, hydrogen

peroxide et cetera. are killed in less than a minute (G. Kampfa et al., 2020). Finally, the infection also can be acquired by either inhaling or touching surfaces contaminated by these droplets and touching the nose, mouth, and eyes (Rothe et al., 2020). An observational study reported that students touch their face with their own hands-on average 23 times per hour, with contact mostly to the skin (56%), followed by mouth (36%), nose (31%), and eyes (31%) (Lee et al., 2015).

As there is no safe and effective COVID-19 medicine, a strict guideline has been developed by the WHO to adhere to during the pandemic. In an effort to curb the spread of SARS-CoV-2 worldwide, standard precautions are very important to set out so that can suppress the spread of the viral infection, such as regular hand wash with soap or used a hand sanitizer, avoid handshaking, ensure wear a mask in crowded, social distancing of one to two meters apart, use disposable tissue if coughing or into a flexed elbow, self-isolating if symptomatic and avoiding of gathering and unnecessary travel to affected areas (Elengoe, 2020). The commitment of people to these control measures is necessary to achieve ultimate success against COVID-19 in Malaysia.

This study was conducted among dental, medical, and nursing students because they involve theoretical and practical educational processes (Günay & Kılınç, 2018; Spagnuolo et al., 2020; Stites et al., 2018). In the practical educational process, they need to provide care of people in a different real healthcare environment, especially in hospitals or clinics. Besides nursing and medical students that high risk for COVID-19, dental students are also at high risk for COVID-19 infection. In particular, dentists are exposed to a high risk of SARS-CoV-2 infection due to the inability to maintain an interpersonal distance of more than one meter and exposure during surgery to saliva, blood, and other body fluids (Spagnuolo et al., 2020). Hence, knowledge of COVID-19 and practice towards the prevention of COVID-19 among undergraduate students of USM is crucial

to reducing the risk of COVID-19 infection during their clinical placement at Hospital USM.

1.2 Problem Statement

A new coronavirus disease (COVID-19) started its journey around the world in December 2019 (Taghrir et al., 2020). On 18 March 2020, the Malaysian Prime Minister enforced a Movement Control Order (MCO) as a mitigation effort to reduce community spread and the overburdening of the health system of the country (Azlan et al., 2020). A total of 3,182 deaths have been reported due to COVID-19 infection on 4th June 2021 (KKM, 2021).

Knowledge, attitude, and practices (KAP) towards COVID-19 play an integral role in determining the readiness of a society to accept measures of behavioral change from health authorities (Azlan et al., 2020). In order to determine the type of intervention that may be required to change misconceptions about the virus, KAP studies provide basic data (Azlan et al., 2020). It would be helpful to evaluate the COVID-19 related to KAP to provide better insight to address poor knowledge of the disease and to develop preventive strategies and health promotion programs (Azlan et al., 2020).

As a knowledge, this study has not been conducted among university students in Malaysia, but the researcher found a study conducted among Malaysian residents. A study by Azlan et al. (2020) on knowledge, attitudes, and practices among the 4,850 Malaysian residents showed that 77.2% of participants were able to obtain scores above 10 out of 13 questions. Based on the result shown, we can conclude that Malaysians have knowledge about the pandemic that is happening in Malaysia. However, nearly half of the respondents in that study reported they did not wear a face mask when leaving home.

Therefore, the researcher would like to conduct this study on university students to study whether these students have the same level of knowledge on COVID-19 and practice towards the prevention of COVID-19 as the respondents in the previous study or undergraduate university students have better knowledge and prevention practice since they are students with medical backgrounds.

Knowing that even asymptomatic individuals will potentially transmit COVID-19, the risk of getting COVID-19 infection is multiplied (Bai et al., 2020; Biscayart et al., 2020; Pal et al., 2020). The rate of transmission to health professionals was 29% (D. Wang et al., 2020). This can be proved by the statement of the Director-General of Health Malaysia that as of 26 March 2020 at noon, it has been reported that a total of 80 health workers were tested positive for COVID-19 (KKM, 2020).

Researchers argue that if health workers have a high risk for getting COVID-19 infection then students who conduct their clinical training at Hospital USM will also have a high risk for getting COVID-19 infection. Taghrir et al. (2020) also stated in their study that as frontline health care workers, medical students are also susceptible to being infected by the virus. Dental students, medical students especially nursing students need to provide holistic care of patients at Hospital USM. In this population, the lack of proper related information will make them overestimate the situation, increase their level of stress and anxiety, and disrupt the appropriateness of their medical judgments (Kim & Choi, 2016). In addition, there are two positive cases of COVID-19 related to university students in Kota Kinabalu who are Universiti Malaysia Sabah (UMS) students (Miwil, 2020).

By conducting this study, the researcher was able to collect data related to students' knowledge of COVID-19 and the way students practice the prevention towards

COVID-19 which has been stated by the Ministry of Health Malaysia. With such information, health policymakers can make proper planning to prevent the spread of COVID-19 among undergraduate students.

Finally, there is a lack of data assessing knowledge of COVID-19 and practice towards the prevention of COVID-19 among students in Malaysia. Therefore, it is important in conducting this study to determine the level of knowledge on COVID-19 and practice towards prevention of COVID-19 among undergraduate students of medical, dental, and nursing in Health Campus, Universiti Sains Malaysia.

1.3 Research Questions

Guiding the research study and to inform the research, the following research questions were formulated:

i. What is the level of knowledge about COVID-19 among undergraduate students in Health Campus, Universiti Sains Malaysia?
ii. What is the level of practice towards prevention of COVID-19 among undergraduate students in Health Campus, Universiti Sains Malaysia?
iii. Is there any relationship between the level of knowledge about COVID-19 and practice towards prevention of COVID-19 among undergraduate students in Health Campus, Universiti Sains Malaysia.

1.4 Research Objectives

1.4.1 General Objectives

The study aims to assess knowledge of COVID-19 and practices towards prevention of COVID-19 as well as examine the relationship between knowledge and practices among undergraduate students in Health Campus, Universiti Sains Malaysia.

1.4.2 Specific Objectives

The specific objectives for the study are:

i. To determine the level of knowledge about COVID-19 among undergraduate students in Health Campus, Universiti Sains Malaysia.
ii. To identify the level of practices towards prevention of COVID-19 among undergraduate students in Health Campus, Universiti Sains Malaysia.
iii. To determine the relationship between the level of knowledge about COVID-19 and practice towards prevention of COVID-19 among undergraduate students in Health Campus, Universiti Sains Malaysia.

1.5 Research Hypothesis

Ho: There is no significant relationship between the level of knowledge about COVID-19 and practices towards prevention of COVID-19 among undergraduate students in Health Campus, Universiti Sains Malaysia.

HA: There is a significant relationship between the level of knowledge about COVID-19 and practices towards prevention of COVID-19 among undergraduate students in Health Campus, Universiti Sains Malaysia.

1.6 Significance of the Study

To this day, Malaysia is still struggling to reduce the spread of COVID-19 infection. Therefore, health care providers whether staffs or students still have a high risk of getting the infection while providing treatment or nursing care to patients in the hospital. By conducting this study, we can collect data on the knowledge of COVID-19 and practice towards prevention of COVID-19 among undergraduate students in Health Campus, USM. Then, we can control the spread of COVID-19 infection among university students. The poor knowledge regarding COVID-19 and practice towards prevention of COVID-19 may reduce the treatment and increase the number of patients with positive COVID-19. Besides, the significance of this study will be a benchmark of the School of Dental Science, School of Medical Science, and School of Health Science to improve knowledge about COVID-19 by doing talk or class about COVID-19 before they are entering their practicals in the Hospital USM. Incidentally, we can also take care of the safety of students, lecturers, clinical instructors, hospital staff, patients, and patient's families. This study will be helpful to the higher authority and policy marker to plan their strategies in order to prevent the spread of COVID-19.

1.7 Conceptual and Operational Definitions

Table 1.1 Definitions for the operational terms used in this research proposal

Terms	**Conceptual**	**Operational**
Knowledge	Information that is organized, summarized, and synthesized to increase comprehension,	In this study, knowledge refers to the cognition of dental, medical, and

	understanding or, awareness (Bergeron, 2003).	nursing students regarding COVID-19.
Practice	The actual application or use of an idea and belief (Candy & Edmonds, 2018)	The perception of practices towards prevention of COVID-19 among dental, medical, and nursing students.
COVID-19	The abbreviation for coronavirus disease 2019, COVID-19, is the disease caused by a virus called SARS-CoV-2, an abbreviation for severe acute respiratory syndrome coronavirus 2 (Gama et al., 2020).	The knowledge about COVID-19 can give a positive impact on the knowledge and practices of prevention of COVID-19.
Undergraduate	A student at a college or university who has not yet received a bachelor's degree (the first degree given) (Cambridge Dictionary, 2020)	A person who takes a degree or diploma course in Health Campus, USM such as a degree in dental sciences, a degree in medical sciences, degree, and diploma in nursing. The researcher only took those students because they were providing holistic care to patients. Compared to students in other fields, they are not involved in holistic care to patients. Therefore, the risk of getting COVID-19 infection is very low as they can still

		maintain social distancing while conducting clinical training.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter is going to review the literature related to knowledge about COVID-19 and practice towards the prevention of COVID-19. It also presents information on student's knowledge and practice based on the previous studies. Lastly, it describes the theoretical framework chosen for this study. Health Belief Model (HBM) guiding this study.

2.2 Review of Literature

2.2.1 Epidemiology of COVID-19

On 29 December 2019, in Wuhan City, Hubei Province , China, the first four cases of acute respiratory syndrome with unknown etiology were identified among individuals linked to the local market for seafood (wet market) (Li et al., 2020). The average COVID-19 incubation period was estimated at 4.8 ± 2.6, ranging from 2 to 11 days (Liu et al., 2020). The Chinese health authorities' latest guidelines indicate an average duration of incubation of 7 days, ranging from 2 to 14 days (CDC, 2020). The average COVID-19 incubation period of the others studies are estimated at 5.2 days, ranging from 4.1 to 7 days and from 5 to 6 days (Li et al., 2020; Shen et al., 2020).

The effective reproductive number of COVID-19 (2.9) at this early stage is estimated to be higher than the recorded effective reproductive number of SARS (1.77), COVID-19 was found to have higher levels of transmissibility and pandemic risk than SARS-CoV (Liu et al., 2020). Different studies of COVID-19 have estimated the range

of basic reproduction to be between 2.6 and 4.7 (Flaxman et al., 2020; M.Read et al., 2020; Riou & Althaus, 2020; Shen et al., 2020; J. T. Wu et al., 2020). The spread of COVID-19 was relatively fast as there were 213 deaths recorded globally on 31 January 2020 (WHO, 2020c). World Health Organization (2020d) states that in 19 countries outside China, confirmed cases were reported.

2.2.2 Transmission Pattern of COVID-19

COVID-19 was initially hypothesized to be propagated by an animals to humans through direct contact with the intermediary host (Riou & Althaus, 2020). Most early cases appear to have some kind of history of contact with the original market for seafood (Li et al., 2020; Zhou et al., 2020).

Then, a secondary source of infection via close contact has been found to be a human-to-human transmission. Infected individuals without a history of exposure to wildlife or visiting Wuhan have increased, and several cases of infection have been identified among medical professionals (Gralinski & Menachery, 2020; Huang et al., 2020; Li et al., 2020; Liu et al., 2020). On 20th January 2020 occur transmission to healthcare workers who are caring for patients (Singhal, 2020).

The virus is transmitted via oral fluid droplets by asymptomatic infected individuals and symptomatic individuals, mainly airborne via coughing and sneezing (Adhikari et al., 2020a; Singhal, 2020; Yang & Wang, 2020). In addition, a study showed that in patients with positive COVID-19, SARS-CoV-2 nuclei acid can be found in feces and urine, thus it is indicating that SARS-CoV-2 can be transmitted via the fecal-oral route via the digestive tract (Yang & Wang, 2020).

2.2.3 Clinical Manifestation and Diagnosis of COVID-19

There are parallels to SARS-CoV in clinical manifestations of 2019-nCoV infection where the most frequent symptoms include fever, dry cough, dyspnea, chest pain, exhaustion, and muscle ache or call myalgia (Huang et al., 2020; D. Wang et al., 2020; Zhu et al., 2020). Huang et al (2020) and Wang et al. (2020) state that less common symptom includes headache, abdominal pain, diarrhea, nausea, and vomiting. While a study by Li et al. (2020) proved based on the report of the first 425 confirmed cases in Wuhan. The study state that fever, dry cough, myalgia, and exhaustion are common symptoms in a patient of COVID-19 but sputum production, a headache, hemoptysis, abdominal pain, and diarrhea are a less common symptom.

Around 75% of the suspected COVID-19 patients had bilateral pneumonia (Chen et al., 2020). However, unlike SARS-CoV and MERS-CoV infections, very few COVID-19 patients exhibit conspicuous signs and symptoms of the upper respiratory tract such as rhinorrhea, sneezing, or sore throat, implying that the virus may have a greater preference for lower respiratory tract infection (Huang et al., 2020). Among COVID-19 patients, serious complications such as hypoxemia, acute respiratory distress syndrome (ARDS), arrhythmia, shock, acute cardiac injury, and acute kidney injury have been recorded (Chen et al., 2020; Huang et al., 2020). A review of 99 patients showed that about 17% of patients developed ARDS and 11% of them died from multiple organ failures (Chen et al., 2020). The median period of the first signs was 8 days for acute respiratory distress syndrome (D. Wang et al., 2020).

2.2.4 Prevention and Control of COVID-19

The primary measure to interrupt the transmission of COVID-19 in a community setting by isolating infected people, for example, Chinese health authorities takes immediate actions by isolating the infected people and quarantining suspected people and their close contact (C. Wang et al., 2020). The measures taken by the Ministry of Health Malaysia as a standard precaution against COVID-19 are frequently hand wash with soap and water or using an alcohol-based hand sanitizer, wear a face mask in a crowded places, a social distancing of 2 meters, cannot do the mass gathering, when coughing or sneezing must cover the mouth with a disposable tissue or flexed elbow, avoid touching eyes, mouth and nose without hand wash first, avoid handshaking, for immunocompromised or has comorbidities individual should stay at home, cannot travel to any area or countries that affected with COVID-19 and lastly perform COVID-19 screening and self-isolated at home for 14 days upon return from overseas (Elengoe, 2020).

While in a global setting, Chinese authorities were taken immediate measure by locking down Wuhan city to slow the global spread of COVID-19 (Gatera & Pavarini, 2020). In Malaysia, the government decides to improve the effort in the fight against COVID-19 by putting the nation under nationwide movement control order (KKM, 2020). Besides that, unless serious medical care is needed, air travel should be restricted for the cases. In order to identify suspected cases, setting up temperature control or scanning at airports and borders is mandatory (Gatera & Pavarini, 2020). Continued virus research is essential to identify the source of the outbreak and to provide evidence for a future outbreak (Gatera & Pavarini, 2020).

2.2.5 Treatment of COVID-19

Treatment for COVID-19 similar to MERS-CoV and SARS-CoV which is still doing not have any specific antiviral treatment has been confirmed to be effective (Adhikari et al., 2020b; W Tang et al., 2020). Treatment for a patients that positive COVID-19 is applying appropriate symptomatic treatment and supportive care including oxygen therapy, fluid management, and antibiotics treatment for secondary bacterial infections is recommended (Habibzadeh & Stoneman, 2020; Huang et al., 2020). Otherwise, intubation has to be carried out at once if a patient with respiration failure cannot be improved or become worse continuously within a short time after using HFNO or NIV (Ozma et al., 2020).

Disease management was mostly supportive with the severity of the disease introduced by the World Health Organization (WHO, 2020b). Empiric antibiotics should be administered based on clinical diagnosis and local epidemiology and susceptibility information if sepsis is detected (Harapan et al., 2020). Unless other indications are given, routine administration of glucocorticoids is not recommended (WH0, 2020). Also, treatment with corticosteroids does not support clinical evidence (Russell et al., 2020). In addition, for severely ill patients, the use of intravenous immunoglobulin might help (Chen et al., 2020).

While in Malaysia, Hydroxychloroquine which is the function to inhibit endocytic pathways has been proposed as a drug to treat patients COVID-19 by increasing the pH of the endosomes to prevent the pH-dependent entry of the virus into the host cell (Elengoe, 2020; Mauthe et al., 2018). Based on this study, asymptomatic patients not required Hydroxychloroquine treatment (Elengoe, 2020). As of 17th April 2020, the

Malaysia government announced that 56.6% out of the 5,251 COVID-19 positive cases in Malaysia had recovered (KKM, 2020).

2.2.6 Knowledge about COVID-19

A total of ten studies was found and all those previous studies are related to the current study. Among the ten studies included for this review, three were from Jordan (Alzoubi et al., 2020; Khasawneh et al., 2020; Olaimat et al., 2020), with one each of the following from India (Singh et al., 2020) China (Peng et al., 2020), Italy (Gallè et al., 2020), Syria (Alhamid et al., 2020), Iran (Taghrir et al., 2020), Uganda (Olum et al., 2020), and Pakistan (Salman et al., 2020). The primary target population across studies was undergraduate students.

Overall, one study reported their participants had a high level of knowledge regarding COVID-19 (Taghrir et al., 2020), six studies reported who participated in their survey had good knowledge of COVID-19 (Alhamid et al., 2020; Alzoubi et al., 2020; Khasawneh et al., 2020; Olaimat et al., 2020; Olum et al., 2020; Peng et al., 2020), only one study conducted by Gallè et al. (2020) reported their sample had an acceptable knowledge of COVID-19 and two studies reported who participated in their study had satisfactory knowledge related to COVID-19 (Salman et al., 2020; Singh et al., 2020). A study by Olaimat et al. (2020) reported that students who majored in medical sciences showed that the highest mean knowledge score (82.8%) while on the other hand, students of human sciences showed the lowest average knowledge score (78.0%). Based on a previous study, first-year students and non-medical specialties students had lower knowledge levels than others (Alhamid et al., 2020). This is could be due to the less medical education they received compared to advanced or medical students.

Nine studies reported the knowledge of COVID-19 transmission (Alhamid et al., 2020; Gallè et al., 2020; Khasawneh et al., 2020; Olaimat et al., 2020; Olum et al., 2020; Peng et al., 2020; Salman et al., 2020; Singh et al., 2020; Taghrir et al., 2020). The studies reported that most of the participants knew that mode of COVID-19 transmission including physical contact and droplet (Alhamid et al., 2020; Khasawneh et al., 2020; Olaimat et al., 2020; Olum et al., 2020; Peng et al., 2020; Salman et al., 2020; Taghrir et al., 2020). However, some of the participants or students seemed to think that the virus of COVID-19 is likely to be transmitted from the air (Gallè et al., 2020; Khasawneh et al., 2020; Singh et al., 2020). This could be due to confusion between the transmission of airborne and respiratory droplet modes (Khasawneh et al., 2020).

Seven studies reported the knowledge of COVID-19 symptoms (Alhamid et al., 2020; Alzoubi et al., 2020; Olaimat et al., 2020; Olum et al., 2020; Peng et al., 2020; Salman et al., 2020; Taghrir et al., 2020). Most of the participants in the seven studies reported correctly answered that fever, dry cough, and shortness of breath are among the most reported symptoms of COVID-19. However, only a few participants knew that myalgia, rhinorrhea, diarrhea, vomiting, sneeze, fatigue, runny nose, and sore throat was a clinical symptom of COVID-19. For example, a study by Olaimat et al. (2020) among 2083 undergraduate or postgraduate students in Jordan reported that the majority of students correctly answered that fever (93.1%), dry cough (92.0%), and shortness of breath (90.1%) are among the most commonly reported symptoms of COVID-19. The students, on the other hand, showed poor knowledge of other symptoms including myalgia (44.3%), rhinorrhea (40.4%), diarrhea (40.8), and vomiting (28.9%).

Five studies reported the knowledge of COVID-19 preventive measures (Alhamid et al., 2020; Gallè et al., 2020; c; Salman et al., 2020; Taghrir et al., 2020). Knowledge about COVID-19 preventive measures was high among undergraduate students in Italy,

Syria, Iran, Uganda, and Pakistan. This can be proved by most the participants correctly answered that washing hands with soap, wearing a face mask, and avoided crowded places are COVID-19 preventive measures. The study conducted by Salman et al. (2020) among students and employees of two higher education institutions in Lahore, Pakistan, namely the University of Lahore and the Gulab Devi Educational Complex reported that most of the participants correctly answered that washing hands with soap and water (87.5%) and wearing a face mask (92.1%) is an effective prevention strategy for COVID-19. Besides, most of the participants also agreed that avoiding crowded places is a preventive measure against COVID-19 (Alhamid et al., 2020; Gallè et al., 2020; Olum et al., 2020).

Five studies reported the knowledge of the COVID-19 incubation period (Alhamid et al., 2020; Olaimat et al., 2020; Peng et al., 2020; Singh et al., 2020; Taghrir et al., 2020). Based on the result of the studies reported that most of the participants knew that the incubation period for COVID-19 is equal to or less than 14 days. However, some of the studies such as those conducted by Singh et al. (2020), Peng et al. (2020), Taghrir et al. (2020) reported that 52.6%, 30.4% and, 26.2% of students respectively do not know the incubation period for COVID-19. This could be due to the vast diversity of information available through the Internet including unverified malicious information which can spread rapidly and can misguide students (Singh et al., 2020).

Only two studies reported the knowledge of COVID-19 risk factors which are by Khasawneh et al. (2020) and Peng et al. (2020). A study by Khasawneh et al. (2020) reported that 95.0% of medical students believed that people with chronic illnesses are potentially at high risk to COVID-19. They also believed that pregnant women and children were at increased risk to COVID-19 with 48.3% and 23.6% respectively. Besides, a study conducted by Peng et al. (2020) among undergraduate students in China

believed that generally, people such as old, young adults, and people with the preexisting disease are at high risk to COVID-19 with results 50.6%, 34.1%, 1.3%, and 13.4% students respectively.

The knowledge, attitude, perceptions, and practices of people regarding COVID-19 are important predictors of whether they engage in preventive behaviors specific to the disease. Evidence from previous studies shows that greater knowledge about infectious diseases during an outbreak is positively associated with increased involvement in appropriate protective behavior (Gentili et al., 2020; Prue et al., 2017; Toppenberg-Pejcic et al., 2019). In several cases, because of past experiences and beliefs, knowledge can also affect perceptions (Hogg et al., 2017; Oppenheim et al., 2019; Vinck et al., 2019).

2.2.7 Practice on COVID-19 Prevention

In this literature review, practice towards COVID-19 prevention will be assessed using statements in studies related to maintaining social distancing, wearing a face mask, and maintaining hand hygiene. A total of seven studies was found and all the previous studies are related to the current study that will be review in this part.

Based on seven previous studies, only two studies among undergraduate students reported their subjects had a high practice towards preventive measures of COVID-19 (Peng et al., 2020; Taghrir et al., 2020), three studies reported their participants had good practice towards protective measures of COVID-19 (Alzoubi et al., 2020; Khasawneh et al., 2020; Olum et al., 2020), only one study reported considerable practice (Alhamid et al., 2020) and poor practice (Salman et al., 2020) among undergraduate students.

A study by Taghrir et al. (2020) reported that 94.2% of participants had high performance in preventive behaviors and only 5.8% had a low score. This study showed

that their participants had high score practice on avoiding crowded places (99.6%) and often washing hands (96.7%). On the other hand, a study by Olum et al. (2020) among nine medical schools in Uganda reported that only 58% had a high rate of preventive practice behaviors. The gap of the result between in these two studies could be due to in the Iran study they recruited more senior students in their clinical years which are fifth to the seventh-year medical students while a study in Uganda there enrolled first to fifth-year medical students (Olum et al., 2020).

A study that subjects were recruited from ten universities in Shaanxi Province, China results showed that proactive practice towards COVID-19 was found in 82.34% of subjects (718 out of 872 subjects) (Peng et al., 2020). The result of that study is obviously different from the study by Salman et al. (2020) on two Pakistani university populations reported that they had satisfactory knowledge and attitude on COVID-19 but they only had poor practice on preventive measures of COVID-19. In that study also state that if Pakistan's educated sector has poor preventive practices, one may wonder what the general publics' practices will be. This could be because of limited access to online health information resources, illiterate or low-literate, geriatric, and rural populations in Pakistan (Salman et al., 2020) compared to China which is a developed country.

Although a study among nine medical schools in Uganda had good practice towards preventive measures of COVID-19 still have 289 out of 741 students never wearing a mask when getting outside the home (Olum et al., 2020). Besides, studies from Alhamid et al. (2020), Alzoubi et al. (2020), and Khasawneh et al. (2020) reported that 1120 out of 1492, 208 out of 592, and 856 out of 1404 respectively do not wear a face mask when getting outside the home. The result of this review specifically points to a widespread lack of mask-wearing practice among study subjects to prevent COVID-19 infection. To avoid transmission of COVID-19 infections, wearing a face mask as

appropriate is important and can act as a physical barrier to the spread of droplets (Abbott et al., 2020). This could be due to the confusion on advice shared by the WHO that wearing a face mask only who in contact with infected individuals and who become infected with COVID-19 infection (WHO, 2020a).

For the item maintaining social distancing, a study among medical students in Jordan by Khasawneh et al. (2020) reported that 70.1% of participants always follow the social distancing and only 25.9% of participants sometimes and 4.1% of participants never follow the social distancing. This result same as a study among nine medical schools in Uganda by (Olum et al., 2020) reported that 449 out of 741 (61%) participants always maintained a social distancing of 1 meter with anyone coughing or sneezing.

In terms of hand hygiene items, a study by Salman et al. (2020) have the lowest percentage compared to other studies related to undergraduate students. This study reported that only 34.9% of participants always used soap and water to wash hand quickly after coughing or sneezing or touching contaminated objects such as tissue. On the other hand, a study by Taghrir et al. (2020) reported that 96.7% of medical students washed hand more often than usual. The presence of the gap between these two studies could be because the study by Salman et al. (2020) is among university students and employees belonging to medical, pharmacy, and allied health science departments. While a study by Taghrir et al. (2020) only involving medical students only.

2.3 Theoretical and Conceptual Framework of the Study

The theoretical framework for this study is based on the Health Belief Model (HBM). The Health Belief Model (HBM) is a commonly used theory in health education and health promotion (Glanz, Rimer & Lewis, 2002). This model was originally

developed by four psychologists who are Hochbaum, Kegels, Rosenstock, and Leventhal in the year 1950 as a way to assess the reasons that prevented people from the disease (Abraham & Sheeran, 2014). This model helps in evaluate more on how undergraduate student's knowledge toward COVID-19 affects the behavior in the individuals about practices towards the prevention of COVID-19 as a self-care measure.

The HBM was the construct that representing the perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Abraham & Sheeran, 2014). The combination of six constructed HBM will provide a useful framework for designing both shorts also long-term behavior changes strategies. Students' choice to make a healthy change is motivated by their knowledge about the risk of susceptibility towards the disease and knowledge about the severity of the disease.

The students' willingness to change is usually influences by their understanding of the benefits of change and their perception of the barrier to change. Definition of cues to action is when a people or things move people to change their behavior (Abraham & Sheeran, 2014). While for self-efficacy, if someone believes a new behavior is having benefits but does not think that they are capable of doing it and there is a possibility that they will not try (Abraham & Sheeran, 2014).

Perceived susceptibility is one of the most powerful ways to encourage people to adapt to healthier behaviors (Shahnazi et al., 2020). Dental, nursing, and medical students are exposed to microorganisms on an ongoing basis. The fact that individuals are given care. Additionally, they are worried about the fact that they may transmit a virus to a family member or other friends. They think they're at risk of infection, so they're more likely to do something to prevent it from happening. Unfortunately, when people believe that they are not at risk of infection, unhealthy behavior tends to result in the opposite. In

addition, it results in perceived danger when the perception of susceptibility is combined with severity.

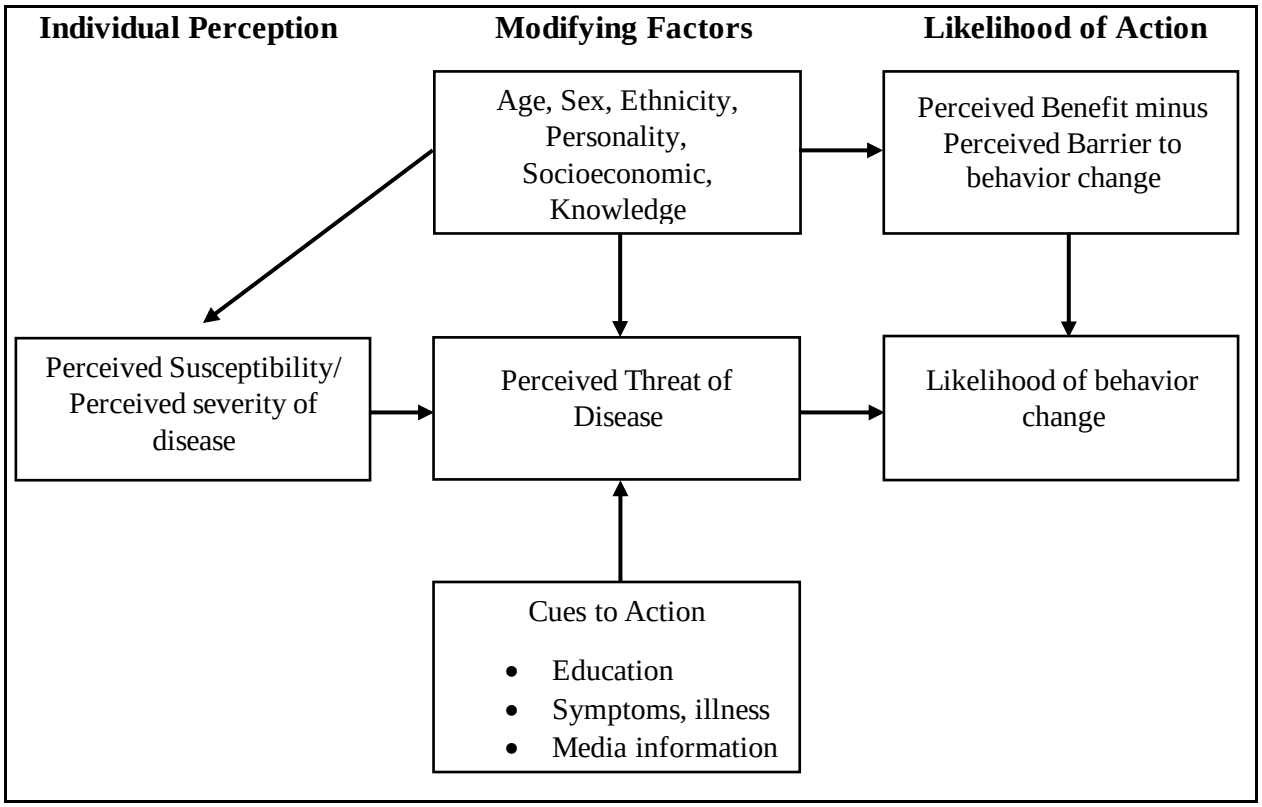

Figure 2.1: The Health Belief Model

(Adopted from Hochbaum, Kegels, Rosentock and Leventhal, 1950)

The perceived threat, in general, in taking preventive measures, construction was an important variable for people to consider themselves susceptible to this disease and consider the severity of this disease to be dangerous (Shahnazi et al., 2020). Many COVID-19 cases cause fatalities. The students will think of the possibility of dying due to disease acquired from an asymptomatic patient, they are influenced to take prevention from happening.

Other factors in the prediction of preventative behaviors from the disease were perceived benefits. In other words, by increasing the perceived benefits, individuals perform better (Abraham & Sheeran, 2014). Perceptions such as the effects of regular hand washing, the use of personal protective equipment such as masks and disposable

gloves can lead to high perceived benefits and are therefore strong motivations for preventive action against this disease (Shahnazi et al., 2020). The students agreed that by applying the standard precautions in their daily practice they are protected from COVID-19.

The perceived barriers are important and effective constructs of the health belief model because, despite their inner desire to participate in preventive behavior, individuals should overcome barriers to behavior (Shahnazi et al., 2020). Excessive barriers can be deterrents and prevent desired health behaviors from being created. In the present study, participants had fewer perceived barriers to individual preventive behaviors, such as hand washing, but environmental barriers such as mask shortages, alcohol pads, and disinfectants strongly influenced them (Mahase, 2020; H. liang Wu et al., 2020). Mask shortages have been observed in most regions of the world due to the COVID-19 pandemic.

Behavior is also affected by indications of action that people tend to change their behavior (Abraham & Sheeran, 2014). Students, for example, always remind students that implementing the standard precaution will improve compliance and decrease infection exposure. The appearance of the patient was thought to be a serious factor that led the students to implement the standard precautions. For self-efficacy, it is difficult for students in difficult circumstances to change their behavior, even though they know it is not correct. For example, when attending patients, they were trained not to wear gloves and it was hard to change the new behavior.

The conceptual framework for this study has been developed based on the Health Belief Model. Perceived susceptibility is the opinion of the individual dental, nursing, and medical students on COVID-19 with related variables consisting of gender, type of