

ORIGINAL ARTICLE

Association Between the Level of Knowledge, Awareness and Attitude on Post-COVID-19 Syndrome Amongst Medical Students in Four Malaysian Universities

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ABSTRACT

Introduction: COVID-19 is a respiratory illness that is caused by a coronavirus. Infected people will have a chance to develop post-COVID-19 syndrome. The aim of this study is to identify the association of gender, marital status, age and university on knowledge, awareness and attitude of post-COVID-19 syndrome among medical students in four universities in Malaysia. **Methods:** A cross-sectional study was conducted from October 2021 to July 2022 at four universities in Malaysia which are Universiti Putra Malaysia (UPM), Universiti Islam Antarabangsa Malaysia (UIAM), Universiti Sains Malaysia (USM) and Universiti Sains Islam Malaysia (USIM). A self-administered questionnaire was administered to 355 respondents consisted of four sections, assessing socio-demographic data and knowledge, awareness and attitudes of post-COVID-19 syndrome. **Results:** 54.4% of the respondents had high knowledge, 53.8% had high awareness, and 55.21% had a high attitude towards post-COVID-19 syndrome. In this study, there is a significant association between knowledge on post-COVID-19 syndrome and the age among respondents. Knowledge and awareness, knowledge, and attitude as well as awareness and attitude on post-COVID-19 syndrome was also found to have significant association among respondents. **Conclusion:** The older age of the respondents have good knowledge towards post-COVID-19 syndrome. *Malaysian Journal of Medicine and Health Sciences (2023) 19(SUPP12): 15-21. doi:10.47836/mjmhs.19.s12.3*

Keywords: Knowledge; Awareness; Attitude; Post-COVID-19 syndrome; Medical students

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research for uniformity and clarity. Post-COVID-19 syndrome has been classified into five categories labelled with Type 1 to Type 5 according to the initial symptoms, duration of symptoms, delayed onset of symptoms, and period of quiescence [3].

INTRODUCTION

Post-COVID-19 syndrome was described as the presence of a variety of symptoms weeks or months after contracting COVID-19 infection that might be persistent or relapsing and remitting [1]. Post-COVID-19 syndrome can be determined by the persistence of clinical symptoms after the start of acute symptoms for more than four weeks [2]. The terminology of post-COVID-19 syndrome can vary from “long COVID-19”, “long term COVID”, “post-acute COVID-19 syndrome”, “chronic COVID-19” and “post-acute sequelae of SARS-COV-2 infection” which all suggests the same meaning as the person’s health has not returned to normal after the COVID-19 infection [3]. However the term “post-COVID-19 syndrome” is used in this

People with post-COVID-19 syndrome may present with one or more symptoms [4]. The symptoms are classified into clinical and neuropsychiatric symptoms [4]. Fatigue and shortness of breath are the most common symptoms among the clinical symptoms group while cognitive impairments are under the neuropsychiatric symptoms group [4]. 92.9% of hospitalized and 93.5% of non-hospitalized COVID-19 patients, respectively, experienced persistent fatigue [4]. Post-COVID-19 patients have a high level of fatigue scores and have a favourable relationship with anhedonia [5]. COVID-19 causes lung problems and over time, these lung problems can cause long-term damage in patients with a post-COVID-19 syndrome that may lead to irreversible dyspnoea [6]. 45.3% of

hospitalized patients and 65.9% of non-hospitalized patients experienced sleep difficulties, tinnitus, anosmia, and/or ageusia, memory loss, lack of concentration, anxiety and/or depression, and peripheral neuropathy [7]. Non-hospitalized patients have a higher percentage; perhaps it is because they receive less medical attention than those who are hospitalized [7].

The risk factors of post-COVID-19 are twice as frequent in women as it is in males, increases in age, more than five symptoms present, and the presence of comorbidities raises the chances of acquiring post-COVID-19 syndrome [1]. Risk factors for the post-COVID-19 syndrome are elaborated into two aspects which are biomarkers and patients with clinical characteristics [8]. In the aspect of biomarkers, survivors of COVID-19 were reported to have elevated blood urea nitrogen (BUN) and D-dimer levels, which were the risk factors for pulmonary dysfunction [8]. Following patients with clinical characteristics, female sex, more than five early symptoms, and first acute COVID-19 severity are among the more major risk variables for extended COVID [8]. On the other hand, despite the fact that male sex and advanced age are linked to a higher incidence of severe COVID-19, the Office of National Statistics (ONS) found that women are far more likely than males to experience any long-term covid symptoms [4]. The goal of post-COVID-19 syndrome management is to improve function and quality of life. Therefore, it is critical to identify individuals with post-COVID-19 syndrome clinically in order to give suitable treatment choices. The management for people with this syndrome includes long-term monitoring, mental health support, rehabilitation services, and social services support [9]. In Malaysia, not much is known about the knowledge, awareness and attitude of post-COVID-19 syndrome, although the COVID-19 has become endemic worldwide.

Medical students in Malaysia represent the future generation of doctors. The country has eleven public universities providing the medical course, ensuring a substantial pool of aspiring healthcare professionals. Additionally, the subject of post-COVID-19 is gaining vital importance among medical students due to its recent emergence. The knowledge surrounding post-COVID-19 is a valuable resource for these students in their care for patients who have recovered from the virus, aiming to enhance their overall quality of life. The selection of medical students for this purpose is justified by their status as future healthcare workers, making their comprehension of this endemic issue crucial to us.

Thus, the objective of this study was to determine the association between sociodemographic factors and the level of knowledge, awareness, and attitude on post-Covid-19 syndrome amongst medical students in

four universities in Malaysia which are USIM, USM, UIAM and UPM.

MATERIALS AND METHODS

Study Design and Setting

This was a cross-sectional study of medical students from the four universities in Malaysia (UPM, UIAM, USM, USIM) from October 2021 to November 2022. These four universities represent the general population from the east and west coast. The inclusion criteria were the medical students from the four universities. The exclusion criteria were the medical students were on study leave or not in active enrolment or refuse to participate in this study.

Research Tool/Instrument

The questionnaires consisted of 4 sections. Section A pertained to socio-demographic profiles, Section B included the questionnaire used to assess knowledge, Section C included the questionnaire used to assess awareness, and Section D included the questionnaire used to assess attitude. The questionnaire was developed through the modification from the previous research papers on COVID-19 by Phoong and Phoong and Al-Hanawi et al. which certain questions can be related to post-COVID-19 syndrome [10,11]. The questionnaire was generated only in English language as our target population was medical students. The content validation of the questionnaires will be assessed by the members of supervisory teams and other experts in the field. Comments will also be taken, and corrections will be made.

The questionnaire consisted of four domains: sociodemographic data, knowledge, awareness and attitude. The first section of the questionnaire was on socio-demographic characteristics. The knowledge domain consisted of 21 items using a three-point Likert scale (True/False/I don't know). A score of "1" was provided for correct answers, and incorrect and "I don't know" responses were scored "0". Meanwhile, awareness and attitude domains were rated on 5-point Likert scale ranging from 1 = strongly disagree to 5 strongly agree. For knowledge, a score that is below 7 indicates low knowledge and a score of 7 and above indicates high knowledge. For awareness, a score that is below 39 indicates low awareness and a score of 39 and above indicates high awareness. For attitude, a score that is below 44 indicates low attitude and a score of 44 and above indicates high attitude.

Data Collection Procedure

Medical students from the four universities were approached using universal sampling. They were informed about the research procedure, and the eligible respondents who fulfilled the inclusion and exclusion criteria were invited to participate in the study. The self-administered questionnaire was

administered through student email and Whatsapp application which then were sent weekly as a reminder to the students. The respondents were informed that the information provided was confidential and they could withdraw at any time from the study. Out of 551 sample sizes, 355 have responded to the questionnaire. There were no credits or payment given for their participation as it was entirely voluntary.

Data Analysis

The data collected were analysed using SPSS IBM version 27 (Statistical Program for Social Science Version 27). Descriptive analysis was used in this study. Normality test for the score of knowledge, awareness and attitude was done by using Kolmogorov-Smirnov, Shapiro-Wilk and histogram. Logistic regression was used to analyze the association between knowledge, awareness and attitude and the four universities.

Ethical clearance

This study was approved by Ethics Committee for Research Involving Human Subjects (JKEUPM) Universiti Putra Malaysia with reference number of JKEUPM-2022-144. Universiti Sains Malaysia, Universiti Sains Islam Malaysia and Universiti Islam Antarabangsa have given permission to proceed with UPM ethical approval. The confidentiality of respondents' data was maintained throughout the study. Prior to conducting the research, consent was obtained from each of the participants.

RESULTS

Majority of respondents were female, which occupied 67.9%, most of the respondents were 20 years old 25.1%, respondents who were single 99.7% and majority of the respondents were students from UPM 42%. The age group of 18-21 respondents were 50.4% while 22-29 age group respondents were 49.6%.

The knowledge score was found out to be not normally distributed. The skewness and kurtosis both have statistic/SE values -6.481 and 3.302 respectively, both values are out of the range of -1.96 to 1.96 and thus suggest the data to be not normally distributed. Kolmogorov-Smirnov and Shapiro-Wilk tests have significance less than 0.05 and thus also suggest the data is not normally distributed. Figure 1 shows the histogram plot of knowledge score together with the bell shaped curve. It is shown that the data is left skewed and thus not normally distributed.

The awareness score was found to be not normally distributed. The skewness and kurtosis both have statistic/SE values -4.225 and 5.384 respectively, both values are out of the range of -1.96 to 1.96 and thus suggest the data to be not normally distributed. Kolmogorov-Smirnov and Shapiro-Wilk tests have significance less than 0.05 and thus also suggest the

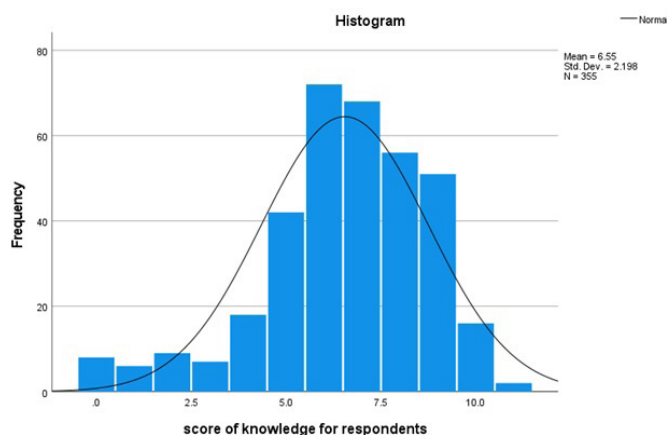


Figure 1 : Distribution of knowledge score.

Table I : Sociodemographic factors of respondents (n=355)

Variable	Frequency (n = 355)	Percentage (%)
Gender		
Male	114	(32.1)
Female	241	(67.9)
Age		
18 - 21 (Preclinical)	179	(50.4)
22 - 29 (Clinical)	176	(49.6)
Marital Status		
Single	354	(99.7)
Married	1	(0.3)
Divorced	0	(0.0)
University		
USIM	54	(14.4)
USM	126	(35.5)
UIAM	29	(8.2)
UPM	149	(42.0)

data is not normally distributed. Figure 2 shows the histogram plot of knowledge score together with the bell-shaped curve. It is shown that the data is left skewed and thus not normally distributed.

The attitude score was found to be not normally distributed. The skewness and kurtosis both have statistic/SE values -7.612 and 16.415 respectively, both values are out of the range of -1.96 to 1.96 and thus suggest the data to be not normally distributed. Kolmogorov-Smirnov and Shapiro-Wilk tests have significance less than 0.05 and thus also suggest the data is not normally distributed. Figure 3 shows the histogram plot of attitude score together with the bell-shaped curve. It is shown that the data is left skewed and thus not normally distributed.

Table II : Association between knowledge, awareness and attitude and sociodemographic factors

	Low N, %	High N, %	Total N, %	Chi-Square Value	P-value
KNOWLEDGE					
Age				14.489	<0.001
18-21	100 (55.6%)	80 (44.4%)	180 (100%)		
22-29	62 (35.4%)	113 (64.6%)	175 (100%)		
Total	162 (45.6%)	193 (54.4%)	355 (100%)		
Gender				1.290	0.256
Male	57 (50.0%)	57 (50.0%)	114 (100%)		
Female	105 (43.6%)	136 (56.4%)	241 (100%)		
Total	162 (45.6%)	193 (54.4%)	355 (100%)		
AWARENESS					
Age				0.211	0.646
18-21	81 (45.0%)	99 (55.0%)	180 (100%)		
22-29	83 (47.4%)	92 (52.6%)	175 (100%)		
Total	164 (46.2%)	191 (53.8%)	355 (100%)		
Gender				2.797	0.094
Male	60 (52.6%)	54 (47.4%)	114 (100%)		
Female	104 (43.2%)	137 (56.8%)	241 (100%)		
Total	164 (46.2%)	191 (53.8%)	355 (100%)		
Knowledge Group				13.452	<0.001
Low knowledge	92 (56.8%)	70 (43.2%)	162 (100%)		
High knowledge	72 (37.3%)	121 (62.7%)	193 (100%)		
Total	164 (46.2%)	191 (53.8%)	355 (100%)		
ATTITUDE					
Age				3.386	0.066
18-21	72 (40.0%)	108 (60.0%)	180 (100%)		
22-29	87 (49.7%)	88 (50.3)	175 (100%)		
Total	159 (44.8%)	196 (55.2%)	355 (100%)		
Gender				0.452	0.501
Male	54 (47.4%)	60 (52.6%)	114 (100%)		
Female	105 (43.6%)	136 (56.4%)	241 (100%)		
Total	159 (44.8%)	196 (55.2%)	355 (100%)		
Knowledge Group				6.011	0.014
Low knowledge	84 (51.9%)	78 (48.1%)	162 (100%)		
High knowledge	75 (38.9%)	118 (61.1%)	193 (100%)		
Total	159 (44.8%)	196 (55.2%)	355 (100%)		
Awareness Group				71.675	<0.001
Low awareness	113 (68.9%)	51 (31.1%)	164 (100%)		
High awareness	46 (24.1%)	145 (75.9%)	191 (100%)		
Total	159 (100%)	196 (100%)	355 (100%)		

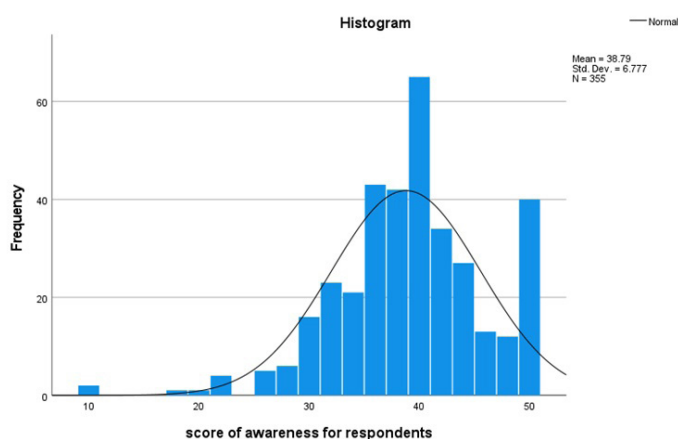


Figure 2 : Distribution of awareness score.

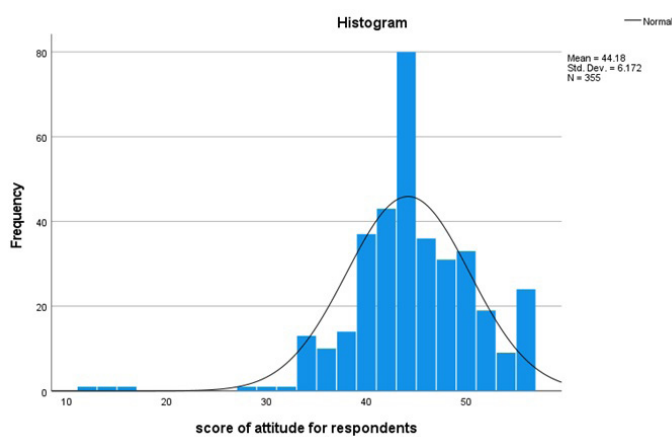


Figure 3 : Distribution of attitude score.

Table II shows the association between knowledge, awareness and attitude with age and gender. Chi-Square test showed there is significant association between total knowledge score with age group. A number of 64.6% from age group 22-29 respondents showed high knowledge scores while a number of 44.4% from age group 18-21 respondents showed high knowledge scores in post-COVID-19 syndrome. There is no significant association between gender and knowledge score. A number of 56.40% female respondents showed high knowledge scores while a number of 50% male respondents showed high knowledge scores in post-COVID-19 syndrome. According to the table, the Chi-Square test showed there is no significant association between total awareness score and age group. A number of 52.6% from age group 22-29 respondents showed high awareness scores while a number of 55.0% from age group 18-21 respondents showed high awareness scores in post-COVID-19 syndrome. There is no significant association between total awareness score and gender. A number of 56.80% female respondents showed high awareness scores while a number of 47.40% male respondents showed high awareness scores in post-COVID-19 syndrome. Chi-Square test showed there is no significant association between total attitude score and age group shown in Table II. A number of 50.3% from age group

22-29 respondents showed high attitude scores while a number of 60% from age group 18-21 respondents showed high attitude scores in post-COVID-19 syndrome. There is no significant association between total attitude score and gender. A number of 56.40% female respondents showed high attitude scores while a number of 52.60% male respondents showed high attitude scores in post-COVID-19 syndrome.

Table II shows that there is significant association between knowledge and awareness of post-COVID-19 syndrome. The results stated that 62.7% of respondents who had a high knowledge were having high awareness. There is also significant association between knowledge of respondents with their attitude as shown in the table. The results stated that 61.1% of respondents who had a high knowledge were having a high attitude. It also showed significant results of the Chi-Square test between awareness and attitude of post-COVID-19 syndrome among the respondents. The results stated that 75.9% of respondents who had a high awareness were having a high attitude.

DISCUSSION

Knowledge on post-COVID-19 syndrome

The score which was higher than the median score was classified as high knowledge whereas the score which was lower than the median score was classified as low knowledge. The results from the total knowledge score showed that 54.4% of respondents had high knowledge scores while 45.6% of respondents had low knowledge scores. From the study, the highest score was 11 while the lowest score was 0. Among this, question number 4 had the highest number of respondents who answered correctly whereas question 11 had the lowest number of respondents who answered correctly (Table I). Based on table II, there is significant association between total knowledge score with age group. In this study, respondents from the age group 22-29 (clinical) were shown to have a high knowledge compared to respondents from the age group 18-21 (pre-clinical). This might be due to the fact that the older you get, the more likely you are going to be exposed to more information, especially clinical students that are more exposed to COVID-19 cases. As one’s age increases by a year, the probability of having higher knowledge increases by 2% [12]. For gender, there was no significant association between gender and level of knowledge of post-COVID-19 syndrome. However, female respondents showed high knowledge scores compared to male respondents. A study done in Malaysia states that higher knowledge on COVID-19 can be found among female participants [13]. This might be due to the fact that there are more female students in the medical related field which leads to the result of more females having higher knowledge compared to males. The association between marital status and knowledge cannot be

investigated in this study as the respondents for married and divorced were extremely less. Apart from this, university of respondents is not statistically significant associated with probability of having high knowledge. This might be due to the same educational system background for all the universities.

Awareness on Post-COVID-19 Syndrome

The score which was higher than the median score was classified as high awareness whereas the score which was lower than the median score was classified as low awareness. The results from the total awareness score showed that 53.8% of respondents had high awareness scores while 46.2% of respondents had low awareness scores. From the study, the highest score was 50 while the lowest score was 10. Among this, question number 10 had the highest number of respondents who answered strongly agree whereas question 1 had the lowest number of respondents who answered strongly agree. Based on table II, there is no significant association between total awareness score and age group. This might be due to the ignorance of the students toward post-COVID-19 syndrome since we are already in the endemic phase. The study that was conducted in Indonesia about the awareness on COVID-19 also shows that the awareness did not differ from age category [14]. For gender, there was no significant association between gender and level of awareness of post-COVID-19 syndrome. A study conducted in Syrians shows that there were no significant difference between males and females [15]. Females have demonstrated more awareness in knowledge-seeking behaviours [16]. This could be due to there being more females studying on medical related courses, therefore females are having higher awareness compared to male. The association between marital status and knowledge cannot be investigated in this study as the respondents for married and divorced were extremely less. Apart from this, university of respondents is not statistically significant associated with probability of having high knowledge. This might be due to the same educational system background for all the universities.

Attitude on Post-COVID-19 Syndrome

The score which was higher than the median score was classified as high attitude whereas the score which was lower than the median score was classified as low attitude. The results from the total attitude score showed that 55.21% of respondents had high attitude scores while 44.79% of respondents had low attitude scores. From the study, the highest score was 55 while the lowest score was 12. Among this, question number 7 had the highest number of respondents who answered strongly agree with 54.93% whereas question 5 had the lowest number of respondents who answered strongly agree with 11.55%. Based on table 2, there is no significant association between total awareness score and age group. The main reason could be that

most people pay more attention on COVID-19 rather than post-COVID-19 syndrome. Apart from this, there was no significant association between gender and attitude of post-COVID-19 syndrome. People living with senior citizens, women, and children have more favorable attitudes [17]. This could be due to the fact that these people are responsible for their families. This could indicate that women have a more responsible attitude toward the post-COVID-19 syndrome compared to men. The association between marital status and knowledge cannot be investigated in this study as the respondents for married and divorced were extremely less. Regarding the university, there is no significant association between the four universities and the level of attitude on post-COVID-19 syndrome. This might be due to the same educational system background for all the universities.

There is significant association between the knowledge and awareness of post-COVID syndrome. The correlation between knowledge and awareness are positive, which the higher the knowledge the higher awareness of post-COVID 19 syndrome. Many of the studies measured knowledge and awareness together instead of assessing them individually. The level of knowledge and awareness among the healthcare workers were studied together in the same questionnaire [18]. One of the reasons could be that knowledge and awareness are about the same, therefore the level of knowledge and awareness that our studies found are positively correlated. There is significant association between the knowledge and attitude of post-COVID-19 syndrome. Being a health worker was found to be substantially linked with high knowledge, a positive attitude, and good practise [19]. From the study that we conducted, the knowledge showed to have a significant association with the attitude of post-COVID-19 syndrome. This clearly shows that when a person has a high knowledge level eventually that particular person has a high attitude toward post-COVID-19 syndrome. There was a significant association between the awareness and attitude of post-COVID-19 syndrome. They found a significant positive correlation between awareness and attitude, indicating that the better the level of awareness was reflected in their attitude [20]. From this study, it shown that when there is high awareness, there will be a high attitude. This clearly showed that a high awareness level would eventually lead to a high attitude towards the post-COVID-19 syndrome.

CONCLUSION

Respondents had high knowledge, high awareness and a high attitude on post-COVID-19 syndrome. Knowledge of post-COVID-19 syndrome was found to be significantly associated with age but not with gender, marital status and university. However, the attitude of post-COVID-19 syndrome was found to be not significantly associated with age, gender, marital status

and university. There were also no sociodemographic factors that were significantly associated with the awareness of post-COVID-19 syndrome. On the other hand, the study found that there are significant associations between knowledge and awareness, knowledge and attitude as well as awareness and attitude on post-COVID-19 syndrome among the respondents that participated.

One of the limitations of this study is only four other universities were involved in this research. In order to obtain more impactful results on knowledge, awareness and attitude of post-COVID-19 syndrome, this study should be conducted in a bunch of locations that are representative of the entire country's population, and it should involve a big number of people. Non-medical students from various faculties at several universities should also be recruited as responders to represent the general population and to discover more about post-COVID-19 syndrome knowledge, awareness, and attitudes.

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