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ORIGINAL ARTICLE

KNOWLEDGE OF COVID-19 AND POST-ACUTE COVID-19 AMONG PHARMACISTS IN MALAYSIA: A CROSS-SECTIONAL SURVEY

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ABSTRACT

Background: Coronavirus-19 has raised concerns as it causes post-acute symptoms among individuals. Appropriate knowledge, attitude, and practice with regards to COVID-19, and its post-acute complications among pharmacists is required for optimum management. Identifying the barriers, and facilitators encountered by pharmacists in providing care to these patients is also vital. The objectives of this study were to determine the knowledge, attitude, practice of COVID-19 and post-acute COVID-19, barriers, and facilitators among pharmacists.

Materials & method: A cross-sectional survey was conducted among pharmacists registered and practicing in Malaysia with consent. An online survey was used to distribute the questionnaire using Google Form through convenient sampling. A questionnaire consisting of four sections was used in the study based on previous work. Data obtained in this study was interpreted using Statistical Package for Social Science (SPSS) (version 28; IBM Corp., Armonk, N.Y., USA). A p-value of <0.05 demonstrated statistically significant findings.

Results: From a total of 405 pharmacists, the knowledge, attitude and practice score of the pharmacists was an average of 5.69 (±0.78) (maximum score 7), 3.56 (±0.63) (maximum score 4) and 3.38 (±0.61) (maximum score 4) respectively. A significant negative correlation was seen between COVID-19 knowledge, and attitude ($r=-0.16$; $p=0.001$), while a positive correlation was seen between knowledge, and practice ($r=0.11$; $p=0.025$). The score for knowledge on post-acute COVID-19 was an average of 12.93 (±2.44) (maximum 20). 82.2% (n=333) respondents agreed that difficulty in accessing patient's clinical data was a barrier, whilst 95.6% (n=387) agreed support of healthcare system was regarded as the most common facilitator.

Conclusion: There is a need for continuous education of COVID-19 as well as post-acute COVID-19 to ensure optimal management of patients.

KEY WORDS: COVID-19; Post-acute COVID-19; Knowledge; Attitude; Practice.

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) caused by the SARS-CoV-2 virus was first detected in Wuhan, China led to a pandemic with a reported death toll of more than 2 million.[1] The major concern of this infection is the high transmissibility and pathogenic nature of the virus.[2] Moreover, despite recovery from an acute infection, patients still complain of symptoms remaining more than four weeks following an acute infection.[3] Many of them require multidisciplinary care to manage the clinical and physical complications of COVID-19 despite recovery from the initial infection.[3]

Appropriate knowledge, attitude, and practice with regards to complications post-acute COVID-19 is required for optimum management. Despite this, there is minimum work looking into the knowledge, attitude, and practice post-acute COVID-19. Previous studies reported good knowledge, attitude, and practices among pharmacists in COVID-19, although challenges arise when facing customers that do not follow appropriate practices such as wearing face mask, and physical distancing.[4-6] Negative attitudes have also been reported due to discomfort associated with the pandemic, and fear of getting

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infected, and infecting family members.[7] However, the knowledge of post-acute COVID-19 remains unknown.

With the persistence of COVID-19 symptoms over 12 weeks[3], pharmacists need to further support patients post-acute COVID-19 although barriers, and facilitators may be encountered. In clinical pharmacy services, shortage of medication, inadequate physical structure of the pharmacy unit, insufficient education, and training are reported as some of the barriers in providing the service.[8] The effectiveness of providing optimum service to patients that are facing discomfort during post-acute COVID-19 may be influenced by various barriers, and facilitators, highlighting the need to identify, and address these factors within the pharmacy practice.

Post-acute COVID-19 is required to be managed optimally, especially with the large number of patients affected before vaccinations were introduced.[9,10] In patients with co-morbidities, despite vaccination, severe COVID-19 may still occur.[10] Therefore, the need to address management of these patients after infection is imminent. This study aimed to identify the baseline knowledge, attitude, and practice of COVID-19, as well as knowledge, barriers, and facilitators in managing post-acute COVID-19 patients among pharmacists.

MATERIALS AND METHODS

Study design: A cross-sectional survey was conducted among pharmacists registered and practicing in Malaysia with consent. An online survey was used to distribute the questionnaire using Google Form through convenient sampling. Practicing pharmacists were included into the study. Provisionally registered pharmacist, pharmacy technicians, and incomplete questionnaires were excluded from the study. The sample size was calculated using the Cochran's sample size formula[11] with population size of 18, 540 reported in PRISMA (Prisma, 2022), 95% confidence interval, 5% margin of error, and 50% response distribution, the minimum sample size required was 377 pharmacists.

Data collection: A questionnaire consisting of four sections was used in the study based on previous work.[4,12] The first section includes respondents' demographics such as age, gender, work setting, location of practice, number of years in service, education background, number of pharmacists, and non-pharmacist in the work setting, and approximate number of patients/customers per day.

The second section of the questionnaire assessed the knowledge, attitude, and practice of pharmacists on COVID-19.[4,12] The knowledge, attitude and practice aspect of the survey contains a total of seven questions with a 'yes', 'no', and 'I don't know' response. In this, a score of '1' is given for each correct answer, and '0' is given for, and incorrect or unsure response. A higher score would indicate better knowledge and more positive attitude, and practice of pharmacists on COVID-19.

The third section of the survey focuses on the knowledge of pharmacists in post-acute COVID-19 syndrome that composed of 13 questions.[3,9,13-16] The responses for questions 1-4, and 6-13 was 'true', 'false', and 'I don't know'. For question 5, respondents were asked to determine how common symptoms of post-acute COVID-19 syndrome were. A score of '1' was provided for correct answers, and '0' for incorrect or unsure responses. Higher scores indicated a higher knowledge of post-acute COVID-19 syndrome.

The fourth section of the survey identified barriers, and facilitators of pharmacist in providing support for post-acute COVID-19 patients.[17,18] A total of 14 statements were included for barriers, and 5 statements for facilitators. The responses for each statement were 'agree' or 'disagree'.

Data analysis: Data obtained in this study was interpreted using Statistical Package for Social Science (SPSS) (version 28; IBM Corp., Armonk, N.Y., USA). Kolmogorov-Smirnov test was used to identify normality in the various scores. Mann-Whitney U test was conducted to determine the relationship between knowledge, attitude, practice, barriers, and facilitators of pharmacists, and gender of respondents while Kruskal Wallis H test was performed to determine the relationship between knowledge, attitude, practice of COVID-19, knowledge of post-acute COVID-19, barriers, and facilitators of pharmacists, and other demographic parameters of the respondents. A p-value of <0.05 demonstrated statistically significant findings.

RESULTS

Demographic of respondents: The number of pharmacists included into the study was 405 (Table 1).

Knowledge, attitude, and practice of pharmacist on COVID-19: The total knowledge score of the pharmacists was an average of 5.69 ($\pm$0.78) (range: 0 to 7, maximum possible score 7) (Table 2). The attitude score of pharmacists towards COVID-19 was an average of 3.56 ($\pm$0.63) (range: 0 to 4, maximum possible score 4). Practice scores of pharmacists was an average of 3.38 ($\pm$0.61) (range: 0 to 4, maximum possible score 4). A significant negative correlation was seen between the knowledge, and attitude of pharmacist in COVID 19 ($r=-0.16$; $p=0.001$) while a positive correlation was seen between knowledge, and practice of pharmacist in COVID-19 ($r=0.11$; $p=0.025$). However, no significant association was seen between attitude,

and practice of pharmacists in COVID-19.

Knowledge of pharmacists on post-acute COVID-19: The total score for knowledge on post-acute COVID-19 of pharmacists was an average of 12.93 (±2.44) (range: 0 to 20, maximum possible score 20) (Table 3).

Barriers, and facilitators for providing support in post-acute COVID-19: Among various barriers, the highest responses was seen in lack of advance practice skills. (n=334, 82.5%). Among the facilitators, support of healthcare system was regarded as the most common (n=387; 95.6%) (Table 4)

Table 1: Demographics of the study population (n=405)

Characteristics	Value
Age, mean (SD)	32.11 (5.2)
Gender, n (%)	
Male	108 (26.7)
Female	297 (73.3)
Education, n (%)	
Degree	354 (87.4)
Masters	49 (12.1)
PhD	2 (0.5)
Place of work, n (%)	
Government hospital	203 (50.1)
Government health clinic	75 (18.5)
Retail	42(10.4)
Private Hospital	11(2.7)
Government health office	16(4.0)
Enforcement office	47(11.6)
Industrial	5(1.2)
Academic	6(1.5)
Location, n (%)	
Urban	306 (75.6)
Sub-urban	64 (15.8)
Rural	35 (8.6)0
No of years in service, mean (SD)	7.3(4.8)
Number of pharmacists in setting, mean (SD)	39(49.8)
Number of non-pharmacists in setting, mean (SD)	17(26.8)
Number of patients/customers per day, mean (SD)	558(1330)

Table 2: Knowledge, Attitude and Practice of pharmacist on COVID-19 (n=405)

Questions	Positive, n (%)	Negative, n (%)
Knowledge		
COVID-19 commonly presents with fever, dry cough, and tiredness	392 (96.8)	13 (3.2)
COVID-19 virus spreads through droplets of saliva/ discharge from the nose when an infected person coughs or sneezes.	400 (98.8)	5 (1.2)
Most infected people suffer mild/moderate respiratory illness and can recover without treatment while older people with underlying medical problems are at risk of serious illness.	382 (94.3)	22 (5.4)
It has been believed that COVID-19 originated from bats, and pangolins.	279 (68.9)	126 (31.1)
Public should wear cloth face mask, while surgical mask, and N95 should be reserved for health care worker.	272 (67.2)	133 (32.8)
COVID-19 would not spread from asymptomatic person.	346 (85.4)	59 (14.6)
Infected person should be isolated for at least 10 days	382 (94.3)	23 (5.7)
Attitude		
Do you believe everyone is at risk of COVID-19?	374 (92.3)	31 (7.7)
Do you believe social distancing prevents spread of infection?	345 (85.2)	60 (14.8)
Do you believe wearing facial mask, and hand hygiene is efficient in controlling infection?	397 (98)	8 (2)
Do you agree that COVID-19 can be effectively controlled in the community?	327 (80.7)	78 (19.3)
Practice		
Did you visit any crowded place recently?	184 (45.4)	221 (54.6)
Do you practice hand hygiene before, and after patient contact?	391 (96.5)	14 (3.5)
Do you wear face mask, and/ or shield during work?	398 (98.3)	7 (1.7)
Do you obey strategies recommended by Ministry of Health in prevention of infection?	397 (98)	8 (2)

Table 3: Knowledge on post-acute COVID-19 (n=405)

Questions	Correct, n (%)	Incorrect, n (%)
Post-acute COVID-19 can be divided into two categories-sub-acute, and chronic	289(71.4)	116(28.6)
Post-acute COVID-19 is defined as symptoms persist beyond 12 weeks	224(55.3)	181(44.7)
Patients may get re-infected post-recovery	368(90.9)	37(9.1)
Post-acute COVID-19 infection depends on the extent, and severity of viral attack on different organs, and cell type.	337(83.2)	68(16.8)
Common signs, symptoms, and findings		
Dry cough	373(92.1)	32(7.9)
Dyspnea	292(72.1)	105(27.9)
Respiratory failure	211(52.1)	194(47.9)
Dizziness	101(24.9)	304(75.1)
Headache	49(12.1)	356(87.9)
Taste impairment	13(3.2)	392(96.8)
Smell impairment	26(6.4)	279(93.6)
Vision impairment	115(28.4)	290(71.6)
COVID-19 affects patients:		
Functionality during hospital stay	321(79.3)	84(20.7)
Functionality following discharge	268(66.2)	137(33.8)
Quality of life during hospital stay	358(88.4)	47(11.6)
Quality of life following discharge	322(79.5)	83(20.5)
Patients are psychologically affected during hospital stay due to COVID-19 infection	375(92.6)	30(7.4)
Patients are psychologically affected following discharge from COVID-19 infection	350(86.4)	55(13.6)
Patients are in need of pharmacist support during COVID-19 infection	333(82.2)	72(17.8)
Patients are in need of pharmacist support following recovery from COVID-19 infection	338(83.5)	67(16.5)

Table 4: Barriers and Facilitators for pharmacist in providing support for post-acute COVID-19 patients (n=405)

Barriers/ Facilitators	Agree, n(%)	Disagree, n(%)
Barriers		
Lack of fund	328(81.0)	77(19.0)
Difficulty in accessing patient's clinical data	333(82.2)	72(17.8)
Difficulty in accessing patient's laboratory data	309(76.3)	96(23.7)
Lack of clinical knowledge	310(76.5)	95(23.5)
Lack of motivation	248(61.2)	157(38.8)
Lack of time	332(82.0)	73(18)
Lack of private counselling area	332(82.0)	73(18)
Less financial incentive	302(74.6)	103(25.4)
Low expectation of pharmacy profession	319(78.8)	86(21.2)
Lack of advance practice skills	334(82.5)	71(17.5)
Interprofessional obstacles	296(73.1)	109(26.9)
Patient's post-traumatic stress disorder	281(69.4)	124(30.6)
Pharmacist have less confidence when dealing with patients with mental health conditions	238(58.8)	167(41.2)
Stigmatising attitudes towards people with mental health illness	277(68.4)	128(31.6)
Facilitators		
Support of healthcare system	387(95.6)	18(4.4)
Easy access to post COVID-19 patients	353(87.2)	52(12.8)
Collaboration with other healthcare professionals	380(93.8)	25(6.2)
Support of other pharmacy staffs	376(92.8)	29(7.2)
Adequate pharmacy structure for patient care	365(90.1)	40(9.9)

DISCUSSION

The COVID-19 pandemic has further strengthened the need for pharmacists to support a burdened healthcare system. COVID-19 has resulted in a high death toll[1], affecting both the public, as well as healthcare workers.[19] Pharmacists play a key role in dealing in providing appropriate care to COVID-19 patients during as well as after infection.[16] As a result, ensuring appropriate knowledge of COVID-19 for pharmacists is of paramount importance. The current work serves as a baseline study demonstrating the current knowledge, attitude, and practice of COVID-19 as well as the knowledge of post-acute COVID-19 among pharmacists in which studies are lacking.

Pharmacists were found to have knowledge, attitude, and practice scores that was comparable to previous work.[6] Most pharmacists were able to identify COVID-19 signs, and symptoms similar to other work.[6] However, one of the first steps in reducing transmission is ensuring preventive steps are taken such as mask wearing.[6] Nonetheless, a third of the pharmacists in the study still believed that cloth masks can be used, despite the recommendation that medical masks be used by the public unless cloth masks are multilayered, well filtered, and were water resistant.[20] Cloth masks lack the ability to filter smaller pathogens such as virus[10,20], and are not advisable, highlighting the need for appropriate education of pharmacists. Increasing the knowledge among pharmacists has been associated with better practice, further supporting the need for education.[4] Good knowledge often translates to a more positive attitude, and practice, similar shown in the current study, which further underscores the need to ensure appropriate education among pharmacists.

The knowledge on post-acute COVID-19 was found to require further improvement with the pharmacists' average score observed to be only slightly above mid-point. Post-acute COVID-19 has been reported to affect quality of life, and psychology of patients even during post-acute COVID-19 phase[14], which was correctly identified by majority of the pharmacists in the study. However, interestingly, quite a significant number were unable to state how long post-acute COVID-19 symptoms may last, which has been noted to be more than 12 weeks[3], depending on the extent, and severity of viral attack on different organ, and cells.[9] Post-acute COVID-19 symptoms, and its mechanisms of these effects are not definite with many proposed theory[21], this information might not be exclusively known to pharmacists supporting the need for continuous education.

In an attempt to improve and optimize pharmacy services in post-acute COVID-19 care, other barriers, and facilitators were also identified. The most common barriers identified in this study was difficulty in accessing patient's clinical data, lack of time, and lack of private counseling area. Previous studies have similarly highlighted the need for access to medical information especially among community pharmacists in order to provide optimum pharmaceutical care.[22] In addition to this, the high number of customers, and patients as well as the lack of a private space within the pharmacy leads to limited time in providing quality care to patients. This has similarly been reported in other work as a barrier in implementing appropriate pharmaceutical care [(8)]. On the other hand, the pharmacists in the current study agreed that support of the health-care system is an important facilitator, similar reported in other work whereby local healthcare network and local management model characteristics were identified as an important requirement for improving pharmacy services.[23] In addition to this, collaboration with healthcare professionals was also required to ensure optimum management of patients as seen for other services.[23]

As with all questionnaire-based studies, there were a few limitations to the study. Responses on attitude, and practice, barriers and facilitators are based on the honesty of the respondents. Furthermore, the study was performed through convenient sampling which could be improved in future work with randomized sampling. Therefore, generalizability of the results should be done with caution.

CONCLUSION

Knowledge, attitude, and practice of pharmacists on COVID-19 as well as post-acute COVID-19 requires improvement. During the widespread pandemic, the rapid influx of information on COVID-19, and post-acute COVID-19 syndrome as well as its frequent updates may not have been optimally delivered to all healthcare personnel. Therefore, continuous education on COVID-19 management, and treatment updates are vital to ensure optimum management of patients within the community.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	AB, FI
Acquisition, Analysis or Interpretation of Data:	AB, FI, SAAA, MMB
Manuscript Writing & Approval:	AB, FI, SAAA, MMB

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.