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Knowledge, Attitudes, and Practices towards the COVID-19 Pandemic among Pharmacy Staff at a Malaysian Tertiary Hospital in Kelantan

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Abstract*—Introduction:** *The COVID-19 outbreak has caused the government to implement pandemic-related guidelines requiring compliance and understanding by healthcare professionals to mitigate its spread uncontrollably. Pharmacy staff must understand and have the correct perception and practices of the disease to facilitate the public. Thus, this study seeks to assess the knowledge, attitudes, and practices of pharmacy staff at Hospital Raja Perempuan Zainab II in Kelantan, Malaysia.* ***Materials and methods: *A cross-sectional survey was carried out among the employees working in the Department of Pharmacy, Hospital Raja Perempuan Zainab II, Kelantan from September 2021 to March 2022. The instrument used to collect the data was a modified, self-administered questionnaire consisting of three (3) domains (knowledge, attitudes, and practices) and 30 items. The data were analyzed using Statistical Package for the Social Sciences (SPSS) software version 20.0 for Windows.* ***Results:*** *A total of 135 pharmacy staff were recruited, yielding a response rate of 79.4%. They were mostly pharmacists (n=87, 64.4%) and aged 31-40 years (n=70, 51.9%). The median (IQR) for knowledge, attitudes, and practices scores were 32.0 (6.0), 32.0 (7.0), and 58.0 (15.0), respectively. The majority of them were found to have good knowledge (n=131, 97.0%) with positive attitudes (n=1 28, 94.8%), and practices (n=131, 97.0%). All domains were significantly associated with each other and had weak to moderate positive correlations (ρ=0.284-0.516, p<0.001). Significant positive correlations were found between the three (3) domains (ρ=0.284-0.516, p<0.001), although demographic and work-related factors did not significantly affect the results (p>0.005).* ***Conclusions:*** *The pharmacy staff at Hospital Raja Perempuan Zainab II demonstrated proficient levels of knowledge, attitudes, and practices towards the COVID-19 pandemic. Those with better knowledge were more likely to exhibit positive attitudes and practices. However, no significant associations were found between knowledge, attitudes, and practices with demographic or work-related characteristics. These results highlight a strong level of preparedness and awareness among the pharmacy staff. Future research should broaden its scope to include a wider range of healthcare professionals.*

***Keywords*—** *Knowledge; attitudes; practices COVID-19; pharmacy*

I. Introduction

Coronavirus Disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first emerged in late 2019 and was later declared a global pandemic by the World Health Organization (WHO) due to its rapid spread and significant impact on public health. By 2021, Malaysia, like many other countries, implemented various containment measures, such as the Movement Control Order (MCO), to curb the virus's transmission. Early on, Malaysia experienced some success in controlling the outbreak, but later waves of infection placed a considerable strain on public health systems, emphasizing the need for strong community compliance and well-prepared healthcare systems [1], [2].

To control the spread of the virus, the government introduced guidelines that required healthcare professionals to stay informed and follow preventive measures. Pharmacy staff, being essential and easily accessible, need to understand the disease and follow the right practices to support the public. As frontline workers, pharmacists are expected to educate the public and ensure that prevention measures are followed [3], [4].

The knowledge, attitudes, and practices of the public are crucial to the success of these efforts. Several studies in Malaysia have looked at these factors among the general population. One national study found that Malaysians generally demonstrated high levels of knowledge and compliance with preventive practices during the MCO, although variations existed across demographic groups [1]. Another large-scale survey reported that while public understanding of COVID-19 was relatively strong, gaps in behavior and risk perception persisted, highlighting the need for targeted health communication strategies [5].

Equally important is the role of healthcare professionals, especially pharmacists, who are key sources of health information. Being on the frontlines, they need not only clinical knowledge but also a proactive approach to controlling infections. Research among Ministry of Health (MOH) staff in Malaysia showed good overall knowledge and understanding of infection control, though their practices were sometimes inconsistent [3]. Similarly, a study of pharmacists in Ethiopia found that while they were highly aware of COVID-19, only some were fully prepared in their actions, suggesting a discrepancy between knowledge and actual practices [4].

Despite these evidences, there is a lack of local research on the knowledge, attitudes, and practices of pharmacy staff regarding COVID-19 in specific healthcare institutions in Malaysia, particularly in the northeastern region. Understanding how pharmacists in tertiary hospitals interpret

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and respond to the pandemic is vital for improving staff training and public outreach strategies. Thus, this study seeks to assess the knowledge, attitudes, and practices of pharmacy staff at Hospital Raja Perempuan Zainab II in Kelantan, Malaysia.

II. Materials and Methods

A. Design and Study Population

A cross-sectional survey was conducted for four (4) months from September 2021 until December 2021 using self-administered questionnaires. Inclusion criteria were the staff working at Department of Pharmacy, Hospital Raja Perempuan Zainab II. Those who were on long leave during the data collection period were excluded. A pilot study was conducted prior to actual study. It involved 60 respondents consisted of pharmacy staff serving in other hospitals in Kelantan, rather than Hospital Raja Perempuan Zainab II.

B. Data Collection

No sample size calculation was needed for this study, as all eligible pharmacy staff were recruited in the study through universal sampling (n=170). The study instrument used to gather the data was adapted from the previous literature [1]. The original questionnaire had three (3) sections: knowledge (11 items), attitudes (9 items), and practices (7 items). The items were evaluated for internal reliability, with Cronbach's alpha coefficient >0.70.

Permission was obtained from the original authors, who recommended modifying the responses for the knowledge section from a dichotomous scale to a 4-point Likert scale (1=very untrue to 4=very true). The questionnaire was further modified to align with the current national standard operating procedures.

C. Statistical Analysis

Data analyses were gathered using Statistical Package for the Social Sciences (SPSS) software version 20.0 for Windows. The distribution of scores for knowledge (skewness=-1.1, kurtosis=3.9), attitudes (skewness=-1.7, kurtosis=4.9), and practices (skewness=1.9, kurtosis=6.0) showed non-normality, with all variables displaying left-skewed distributions. Therefore, descriptive statistics were presented as medians with interquartile ranges (IQR) for numerical data, while categorical data were presented as frequencies and percentages. Spearman's correlation was used to assess associations between knowledge, attitudes, and practices towards the COVID-19 pandemic among pharmacy staff. The Mann-Whitney U test and Kruskal-Wallis test were employed to examine relationships between demographic and work characteristics and the domains. Statistical significance was set at a 95% confidence level.

D. Ethical Approval

Ethical approval for this research was obtained from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (NMRR-21-1707-61100). The permission to conduct the study was obtained from the hospital director. All respondents were remained anonymous to ensure their confidentiality.

III. Results

A. Pilot Study

The majority of respondents required approximately 15 minutes to complete the questionnaire. A minimum acceptable Cronbach's alpha of 0.6 was adopted to assess internal consistency. The reliability analysis yielded Cronbach's alpha coefficients of 0.651 for the knowledge domain, 0.839 for attitudes, and 0.943 for practices, indicating acceptable to excellent internal consistency across all components. Based on these results, the questionnaire was deemed reliable and subsequently utilized in the main study. Respondents demonstrated a clear understanding of the questionnaire items, and no additional feedback or concerns were reported.

The knowledge section comprised ten (10) items assessing respondents' understanding of the origin of the COVID-19 outbreak, global fatality trends, prevalent myths, transmission modes, symptoms, and both individual and governmental preventive measures. Responses were recorded using a 4-point Likert scale ranging from "very untrue" (1) to "very true" (4), yielding a total score range of 10–40. A score >25 was categorized as good knowledge.

The attitudes section included nine (9) items measuring respondents' perceptions and beliefs regarding COVID-19, rated on a 4-point Likert scale from "strongly disagree" (1) to "strongly agree" (4), with a total possible score of 9–36. A score >23 was classified as positive attitudes.

The practices section consisted of 16 items evaluating respondents' preventive behaviors during the COVID-19 outbreak. These items also used a 4-point Likert scale from "strongly disagree" (1) to "strongly agree" (4), with a total score range of 16–64. A score >40 indicated as positive practices.

B. Demographic and Work Characteristics

A total of 135 pharmacy staff participated in the study, yielding a response rate of 79.4%. The study population (n=135) was predominantly female (n=101, 74.8%), with males comprising 25.2% (n=34). The majority of participants were Malay (n=124, 91.9%), while non-Malay participants accounted for 8.1% (n=11). In terms of age, the largest group was between 31 and 40 years (n=70, 51.9%), followed by those aged ≤30 years (n=45, 33.3%), 41–50 years (n=13, 9.6%), and >50 years (n=7, 5.2%). A substantial proportion of respondents worked in ambulatory (n=47, 34.8%) or inpatient settings (n=38, 28.1%), with fewer in pharmacotherapy (n=33, 24.4%), logistics (n=11, 8.1%), and drug information (n=6, 4.4%). The largest group of respondents were pharmacists (n=87, 64.4%), followed by pharmacy assistants (n=26, 19.3%) and provisionally registered pharmacists (n=22, 16.3%). Regarding professional experience, a notable number had worked for 1–10 years (n=73, 54.1%), followed by those with 11–20 years (n=33, 24.4%), less than 1 year (n=16, 11.9%), and more than 20 years (n=13, 9.6%) (Table 1).

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TABLE 1. The demographic and work characteristics of the study population (n=135)

Characteristics	n (%)
Gender	
Male	34 (25.2)
Female	101 (74.8)
Age group	
≤ 30 years	45 (33.3)
31–40 years	70 (51.9)
41–50 years	13 (9.6)
>50 years	7 (5.2)
Ethnicity	
Malay	124 (91.9)
Non-Malay	11 (8.1)
Workplace	
Ambulatory	47 (34.8)
Inpatient	38 (28.1)
Pharmacotherapy	33 (24.4)
Drug information	6 (4.4)
Logistic	11 (8.1)
Profession	
Pharmacist	87 (64.4)
Provisionally registered pharmacist	22 (16.3)
Pharmacy assistant	26 (19.3)
Working experience	
<1 year	16 (11.9)
1–10 years	73 (54.1)
11–20 years	33 (24.4)
>20 years	13 (9.6)

C. Knowledge, Attitudes, and Practices Level towards COVID-19 Pandemic among Pharmacy Staff

The median (IQR) scores were 32.0 (6.0) for knowledge, 32.0 (7.0) for attitudes, and 58.0 (15.0) for practices. The majority of respondents exhibited good knowledge (n=131, 97.0%), positive attitudes (n=128, 94.8%), and positive practices (n=131, 97.0%) regarding COVID-19. A small number of respondents demonstrated poor knowledge (n=4, 3.0%), negative attitudes (n=7, 5.2%), and negative practices (n=4, 3.0%) (Table 2).

TABLE 2. The knowledge, attitudes, and practices scores among the study population (n = 135)

Domain	Median (IQR)	Level	n(%)
Knowledge	32.0 (6.0)	Good	131 (97.0)
		Poor	4 (3.0)
Attitudes	32.0 (7.0)	Positive	128 (94.8)
		Negative	7 (5.2)
Practices	58.0 (15.0)	Positive	131 (97.0)
		Negative	4 (3.0)

D. Associations between Knowledge, Attitudes, and Practices towards COVID-19 Pandemic

The associations between knowledge, attitudes, and practices were tested using Spearman's correlation due to the highly imbalanced distribution of numerical responses across the domains. There were significant positive correlations between all three (3) domains. Knowledge was moderately correlated with attitudes (ρ=0.366, p<0.001) and weakly correlated with practices (ρ=0.284, p=0.001). A strong positive correlation was observed between attitudes and practices (ρ=0.516, p<0.001).

TABLE 3. The Spearman's correlation coefficients between knowledge, attitudes, and practices scores (n=135)

Variables	Knowledge	Attitudes	Practices
Knowledge	1	0.366**	0.284**
Attitudes	0.366**	1	0.516**
Practices	0.284**	0.516**	1

** Significant at p≤0.001

E. Comparison of Demographic and Work Characteristics with Knowledge, Attitudes, and Practices towards COVID-19 Pandemic

The demographic and work characteristics were compared with knowledge, attitudes, and practices the Mann–Whitney U test and Kruskal–Wallis H test, as appropriate. Ethnicity and workplace were excluded from the analysis due to the highly imbalanced distribution of respondents across categories. However, none of the comparisons showed any significant differences (p>0.05) (Table 4 and 5).

TABLE 4. Comparison of knowledge, attitudes, and practices scores by demographic and work characteristics using Mann–Whitney U test (n = 135)

Demographic and Work Characteristics	Mean Rank	U	*p*-value
Knowledge			
Gender			
Male	65.5	1630.5	0.660
Female	68.9		
Working experience			
≤10 years	67.2	1978.0	0.748
>10 years	69.5		
Attitudes			
Gender			
Male	63.6	1567.5	0.446
Female	69.5		
Working experience			
≤10 years	70.0	1867.0	0.401
>10 years	64.1		
Practices			
Gender			
Male	60.31	1455.5	0.182
Female	70.59		
Working experience			
≤10 years	67.9	2036.5	0.961
>10 years	68.2		

TABLE 5. Comparison of knowledge, attitudes, and practices scores by demographic and work characteristics using Kruskal-Wallis H test (n=135)

Demographic and Work Characteristics	Median (IQR)	H	*p*-value
Knowledge			
Age group			
≤30 years	70.3	0.3	0.874
31-40 years	66.4		
>41 years	68.3		
Position			
Pharmacist	64.8	1.8	0.405
Provisionally registered pharmacist	76.4		
Pharmacy assistant	71.4		
Attitudes			
Age group			
≤30 years	73.5	2.0	0.363
31-40 years	67.1		
>41 years	58.9		
Position			
Pharmacist	63.8	3.8	0.150
Provisionally registered pharmacist	81.7		
Pharmacy assistant	70.2		
Practices			
Age group			

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≤30 years	69.8	1.2	0.555
31-40 years	64.9		
>41 years	74.9		
Position			
Pharmacist	67.5	1.5	0.462
Provisionally registered pharmacist	61.4		
Pharmacy assistant	75.2		

IV. Discussions

The results of this study show that pharmacy staff were well-prepared and professional in responding to the COVID-19 pandemic. This matches trends seen in Malaysia and around the world, where healthcare workers, including pharmacists, have shown strong awareness and followed infection prevention guidelines [1], [3], [4], [6]. The healthcare sector's efforts to share COVID-19 information and enforce MOH guidelines likely helped achieve these positive results [19].

While the high levels of knowledge, positive attitudes, and good practices are encouraging, it raises questions about what contributed to this consistency. It is likely that institutional protocols and regular updates on COVID-19 played a significant role. This is in line with previous research, which emphasizes the importance of clear communication and targeted training in promoting health-related behaviors in the workplace [7], [10], [20].

Correlational analyses revealed significant positive associations between knowledge, attitudes, and practices. These findings support health behavior theories such as the Health Belief Model, which suggests that accurate knowledge enhances the perception of risk and benefits, leading to improved preventive behaviors [12], [13]. Similar trends have been observed among healthcare professionals in other countries, including Ethiopia [4], Pakistan [10], and Uganda [11]. Notably, attitudes were identified as a strong mediator between knowledge and practice, reinforcing the idea that cultivating positive attitudes toward public health responsibilities is crucial in pandemic situations [14].

Despite these encouraging results, the weak correlation between knowledge and practices suggests that having information alone may not be enough to ensure behavioral compliance. Other factors—such as access to personal protective equipment (PPE), peer norms, and managerial support—are likely to play a role. Previous studies have shown that even well-informed healthcare workers can experience shortcomings in behavior due to factors like fatigue, perceived invulnerability, or operational constraints [16], [18].

No demographic or work-related variable was significantly associated with knowledge, attitudes, or practices, which was consistent with several earlier studies [5], [11], [17]. This may indicate the professional standardization of COVID-19 information across healthcare settings, where standard operating procedures apply uniformly across job roles, age groups, and genders. However, other studies have found that more experienced or older professionals sometimes exhibit higher compliance or caution, suggesting that generalizations may not always apply in different contexts [9], [15].

There are a few limitations to this study that should be considered when interpreting the findings. The data were collected from a single tertiary hospital in Kelantan, which may limit the ability to apply the results to other populations in Malaysia. Moreover, the use of self-administered questionnaires introduces the possibility of social desirability bias, where participants may have over-reported their knowledge, attitudes, or practices compared to actual behaviors. The cross-sectional design further limits the ability to infer causality between knowledge, attitudes, and practices. Finally, other important factors, such as institutional policies, leadership support, or access to training, were not assessed, yet these could significantly influence the staff's responses to the pandemic.

Based on the study's findings and limitations, several recommendations are suggested. First, future research should include healthcare facilities from different regions and involve more types of healthcare professionals, such as doctors, nurses, and allied health staff. This would allow for comparisons and give a better understanding of how well healthcare institutions are prepared and their ability to handle disease outbreaks. Longitudinal studies are also recommended to see how knowledge, attitudes, and practices change over time, especially in response to new virus strains or updated health guidelines. Finally, future research should look at factors like access to PPE, communication strategies, and training, to better understand what helps or hinders a good pandemic response.

V. Conclusion

The pharmacy staff at Hospital Raja Perempuan Zainab II demonstrated proficient levels of knowledge, attitudes, and practices towards the COVID-19 pandemic. Those with better knowledge were more likely to exhibit positive attitudes and practices. However, no significant associations were found between knowledge, attitudes, and practices with demographic or work-related characteristics.

These results highlight a strong level of preparedness and awareness among the pharmacy staff. Future research should broaden its scope to include a wider range of healthcare professionals across different hospital departments, providing a more comprehensive understanding of pandemic preparedness within the healthcare system.

Appendix

The questionnaire can be accessed at https://drive.google.com/file/d/1GrmfftvtIOp_zcfqI8NVcvg_ct-xzZkP/view?usp=sharing. Kindly email the corresponding author for permission and further information.

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Conflict of Interest

The authors declare that they do not have any personal or financial conflict of interest that may arise from the research

publication.

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