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Human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS): knowledge, perception, and attitude among pharmacists in Kelantan, Malaysia.

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ABSTRACT

Introduction: Although pharmacists' role in the care of human immunodeficiency virus (HIV)-infected and acquired immunodeficiency syndrome (AIDS) patients is well established, studies had reported pharmacists' negative attitudes towards people living with HIV/AIDS (PLWHA), with negative impact on HIV management. This study aimed to explore pharmacists' knowledge of HIV/AIDS, perception towards the changing of treatment regimens of HIV/AIDS, attitudes towards PLWHA, and to identify factors affecting the pharmacists' attitudes towards PLWHA in the state of Kelantan, which reportedly have the third highest number of HIV/AIDS patients in Malaysia.

Materials and method: A validated online 43-item questionnaire was distributed to 400 pharmacists in Kelantan. Multivariate logistic regression was performed to identify factors associated with pharmacists' negative attitude towards PLWHA.

Results: A total of 170 respondents (response rate 42%) completed the questionnaire. Respondents had knowledge on the potential causes of HIV infection [median (IQR) score=13.00(1); maximum score=14.00], and preventive measures of HIV/AIDS transmission [median (IQR) score=12.00(1); maximum score=12.00]. On decision in changing regimens, the respondents agreed on the need to change treatment regimen for HIV/AIDS when required [median (IQR) score=7.00(2); maximum score=8.00]. Up to 40.6% of respondents thought that the treatment regimen should not be switched based on cost. Two-thirds of the respondents had negative attitudes towards PLWHA (67.1%). Respondents who worked in community pharmacy reported positive attitudes towards PLWHA (Adj OR=0.125; 95%CI=0.025-0.623; $p=0.011$).

Conclusion: Pharmacists in Kelantan had several misconceptions towards the causes of HIV/AIDS, preventive measures of HIV/AIDS transmission, and necessity in changing treatment regimen when required. Despite good disease related knowledge, most pharmacists had negative attitudes towards PLWHA, while pharmacists working in community settings presented more positive attitudes towards PLWHA.

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Introduction

Human immunodeficiency virus (HIV) remains a major global public health issue. Approximately 36.9 million people globally (World Health Organisation, 2019), and 87,122 people in Malaysia was living with HIV (Ministry of Health Malaysia, 2018) in 2017. Almost 33 million lives were claimed by HIV infection by 2019. However, with the increasing efforts by the healthcare sector in HIV prevention and treatment, the infection has become a manageable chronic health condition (World Health Organisation, 2019). Since 2015, Malaysia has adopted the vision of World Health Organisation (WHO) in the new National Strategic Plan in Ending AIDS 2016-2030 to end the acquired immune deficiency syndrome (AIDS) epidemic as a public health threat by year 2030, with the goal of “Three Zeros: Zero new HIV infections, zero HIV-related deaths and zero HIV-related discrimination” (Ministry of Health Malaysia, 2015).

Antiretroviral therapy (ART) is the main treatment in management of HIV infection. High levels of adherence towards ARTs of greater than 95% is needed to adequately suppress HIV-viral replication, produce long-lasting response, and halt disease progression (Paterson *et al.*, 2000). Poor patient and health care providers relationship was found to be among one of the significant causes of poor adherence to ART (Schaecher, 2013). Involvement of pharmacists in the care of people living with HIV/AIDS (PLWHA) has been proven to be associated with better treatment outcomes through ART adherence enhancement and pill burden reduction, resulting in improved CD4 cell counts, rates of viral suppression, and reduced medication errors (Tseng *et al.*, 2012).

HIV-related discrimination is defined as the act of treating PLWHA differently than those without HIV; while HIV stigma is defined as the negative beliefs, feelings, and attitudes towards PLWHA (Centers for Disease Control and Prevention, 2019). HIV-related stigma and discrimination is a recognised barrier in combating HIV burden. In Thailand, it was found that PLWHA were being denied health care services, provided with poor quality and delayed care, and were treated discriminatorily with violated rights due to the HIV-related stigmatization and discrimination (Pudpong *et al.*, 2014). These negative experiences may hinder PLWHA to seek or to access healthcare services.

In Malaysia, pharmacists play significant roles in providing education and counselling to PLWHA. In clinical settings, specialised medication therapy adherence clinics run by pharmacists were set up to monitor therapy adherence and outcomes, assess medication-related issues, and provide quality services for PLWHA (Pharmaceutical Services Division Ministry of Health Malaysia, 2014). Although pharmacists' involvement in HIV-positive patients care is well-established and recognised, one study conducted among hospital pharmacists in Kedah, Malaysia

reported that hospital pharmacists had negative attitudes towards PLWHA (Khan & Baig, 2013). This may indicate hindrance towards health-care accessibility of PLWHA which can further impair the Ministry of Health's efforts to curb the disease. However, these findings may not be generalised to Kelantan, a different state in Malaysia with the third most HIV case prevalence (10.3%). Distribution of HIV-positive cases were lower in Kedah (6.1%) (Ministry of Health Malaysia, 2018), and the pharmacists' exposure and awareness towards HIV may be lesser.

In addition, the population and cultural distribution of Kedah and Kelantan is very different. In terms of ethnicity groups, Kedah consists of 78% Malays, 13.6% Chinese, and 7.2% Indians; while Kelantan consists 95.6% Malays, 3.4% Chinese, and 0.3% Indians (City Population, 2017). These significant differences between the states may lead to differences in cultural beliefs which may further affect attitude towards PLWHA. Furthermore, since the initiation of WHO's National Strategic Plan in Ending AIDS in 2015, there has been increased educational activities to promote awareness and reduce HIV-stigma in the recent years (Ministry of Health Malaysia, 2015). Therefore the findings by Khan and Baig (2013) may not reflect the current scenario among pharmacists in Malaysia. Hence, this study was conducted to explore pharmacists' knowledge towards HIV/AIDS, perceptions towards changing of treatment regimen in HIV/AIDS, attitudes towards PLWHA, and investigate the factors affecting pharmacists' attitudes towards PLWHA in the state of Kelantan, Malaysia.

Methodology

Study design and study process

This cross-sectional self-administered online questionnaire-based study was conducted among pharmacists who worked in Kelantan, Malaysia. Ethical approval was obtained from the Ministry of Health Medical Research Ethics Committee (NMRR-19-26-45683). All fully registered pharmacists and provisionally registered pharmacists who practiced in Kelantan were recruited. Pharmacists who were non-Malaysian, retired, and on study leaves were excluded. The samples were included by using convenience sampling.

Emails of pharmacists who worked in Kelantan were obtained through Pharmaceutical Services Division of Kelantan with permission. Softcopies of formal invitations were distributed through valid emails to 400 pharmacists. Emails were not sent to pharmacists who had no record of emails or with invalid emails, and pharmacists who met the exclusion criteria. Two reminder emails were sent on two weeks intervals to increase the number of participants. Participation by pharmacists into this study was voluntary.

After informed consent form was signed, study participants were required to fill in respective pharmacist's registration number as a measure to ensure that only

pharmacists were included into this study, and to avoid duplication of responses. Instructions on filling the questionnaire were provided at the start of the questionnaire. All questions were displayed in the online questionnaire. For open-ended questions, participants were required to type in their answers. For closed-ended questions, participants were required to choose only one answer from the options displayed. The participants were required to answer all the questions before submitting the questionnaire. All the data were synchronised into a password-protected online subject data sheet automatically.

Study sample

Traced data from Pharmaceutical Services Division of Kelantan had shown that there were 334 pharmacists working in government facilities, 109 pharmacists working in private sectors, and 40 pharmacists working in academic institution. By using Raosoft® Sample Size Calculator, assuming the margin of error = 5%; confidence level = 95%; population size = 483; and response distribution = 50%, the minimum sample size required was 215.

Study instrument

Permission for the adoption of the validated questionnaire was obtained from Khan and Baig (2013). The questionnaire was developed into an online questionnaire. The questionnaire consisted of six sections. Compared to the questionnaire by Khan and Baig (2013), collection of demographic data were modified to include academic qualifications and place of practice, and to exclude marital status. There were no modifications done on the questionnaire from section two to section six, which consisted of 43-items. A pilot test was carried out among 20 pharmacists working in other states of Malaysia. Respondents who were involved in the pilot study were not included in this study sample.

Section one was designed to obtain the respondents' demographic information including age, gender, race, academic qualification, job experience, number of HIV encountered in the past twelve months, and place of practice. Section two was designed to assess respondents' general knowledge regarding HIV/AIDS. Three open-ended questions were included in this section, including "What does the abbreviation of AIDS stands for?", "Is HIV a transmittable disease?", and "Can HIV/AIDS be cured at this moment?".

Nominal scale "Yes/No" was applied for the respondents to answer the statements from sections three and four. Section three was designed to assess respondents' knowledge towards the causes of HIV/AIDS, which consisted of 14 items. "Yes" were the correct answers for statements one to eight. "No" were the correct answers for statements 9 to 14. One point was awarded to the respondent's score for every correct answer. Section four

was designed to assess respondents' knowledge towards the preventive measures of HIV transmission, which consisted of twelve items. "Yes" were the correct answers for statements one to six. "No" were the correct answers for statements seven to twelve. One point was added to the respondent's score for every correct answer.

Section five was designed to assess respondents' perceptions on the decision in changing therapeutic regimen of HIV-positive patients, which consisted of eight items. Nominal scale "Yes/No" was applied for the respondents to answer the statements in this section. Section six was designed to evaluate the respondents' attitudes towards PLWHA, which consisted of six questions. Nominal scale "Yes/No" was applied for the respondents to answer the statements in this section. For all the statements, every "Yes" contributed one point to the respondent's total scores; while every "No" contributed two points to the respondent's total scores (Khan & Baig, 2013). The maximum possible score on this section was 12. Respondents who scored 6 were classified as having positive attitudes towards PLWHA, who scored 7-10 were classified as having negative attitudes towards PLWHA, and who scored 11-12 were classified as having very negative attitudes towards PLWHA (Khan & Baig, 2013)

Statistical analysis

Data were cleared and analysed using IBM SPSS version 20.0 (IBM Corp, Armonk, NY). Kolmogorov-Smirnov test was used to determine the normality of analysed data, with $p > 0.05$ were considered as normally distributed. As all the numerical data were not normally distributed, the numerical variables were presented as median and interquartile range (IQR). Categorical data were presented as frequency and percentage. The demographic information and response statements were analysed by using descriptive statistics. Logistic regression was used to explore the independent factors contributed to attitudes of pharmacists towards PLWHA. The variables with $p < 0.200$ in simple logistic regression were included into the variable selection for multiple logistic regression model. All the tests were two sided and $p < 0.05$ were considered as statistically significant.

Results

A total of 170 pharmacists (79.1% of the recommended minimum sample size) completed the questionnaire with a response rate of 42%. The baseline demographic data of respondents participated in this study are summarised in **Table 1**. More than half of the respondents were aged 24-30 years old (57.1%). Majority of the respondents were females (78.8%). Most of respondents were Malay (92.4%). Almost one-third of the respondents had job experience of 4-7 years (37.1%), and almost two-thirds of the respondents

encountered 1-20 patients in the past twelve months (62.4%). Most of the respondents worked in government hospitals (61.2%).

Table 1: Demographic data of study respondents

Demographic Data (N = 170)	n (%)
Age (years)	
21-30	97 (57.1)
31-40	60 (35.3)
41-50	11 (6.5)
51-60	2 (1.1)
Gender	
Male	36 (21.2)
Female	134 (78.8)
Race	
Malay	157 (92.4)
Chinese	11 (6.5)
Indian	0 (0.0)
Others	2 (1.1)
Academic Qualification	
Bachelor	159 (93.5)
Master	11 (6.5)
Job Experience	
< 1 year	14 (8.2)
1 – 3 years	37 (21.8)
4 – 7 years	63 (37.1)
8 – 11 years	25 (14.7)
12 – 14 years	13 (7.6)
> 14 years	18 (10.6)
Number of HIV patients encountered for the past 12 months	
None	39 (22.9)
1 – 20 patients	106 (62.4)
21 – 50 patients	14 (8.2)
> 50 patients	11 (6.5)
Place of Practice	
Government Hospital	104 (61.2)
Government Health Clinic	43 (25.3)
Pharmaceutical Services Division	10 (5.9)
Community Pharmacy	9 (5.3)
Academic Institution	2 (1.1)
Private Clinic/ Hospital	1 (0.6)
Pharmaceutical industry	1 (0.6)

Pharmacists' general knowledge about HIV/AIDS

It was revealed that 87.6% of the respondents were aware of the abbreviation of AIDS, 98.8% agreed that HIV is a contagious disease, and 95.9% of the respondents understood that HIV/AIDS is unable to be cured at this moment.

Pharmacists' knowledge towards the causes and preventive measures of HIV/AIDS

Majority of the respondents aware of the potential causes [Median (IQR) score = 13.00 (1.0); maximum score = 14.00] and preventive measures [Median (IQR) score = 12.00 (1.0); maximum score = 12.00] of HIV/AIDS transmission. The respondents showed most erroneous perceptions on the causes of HIV through kissing an HIV-infected person (31.8%), followed by tattoo or body piercing (27.6%), and breast-feeding from an HIV-infected mother (26.5%) (Table 2).

One-sixth of the respondents believed that treating sexually transmitted diseases (STDs) promptly did not prevent transmission of HIV (14.1%), and 10.6% of respondents believed that avoiding mosquitoes' bites can prevent transmission of HIV (Table 3).

Table 2: Pharmacists' knowledge towards the possible causes of HIV infection

Statements	Correctly Answered, n (%)
Sexual intercourse without a condom with HIV-infected person	166 (97.7)
Sharing needle with HIV-infected person	169 (99.4)
Transfusion of HIV-infected blood or receiving HIV-infected organ	169 (99.4)
Having sex with multiple sexual partners with unknown HIV status	167 (98.2)
From an HIV positive mother to her foetus	160 (94.1)
Sharing personal items such as shaving blades	141 (82.9)
Breast-feeding from an HIV-infected mother	125 (73.5)
Having tattoo or body piercing	123 (72.4)
Kissing an HIV-infected person [mouth to mouth/ French kissing]	116 (68.2)
Mosquito bites	156 (91.8)
Sharing/ eating a meal with an HIV-infected person	158 (92.9)
Using a public swimming pool	166 (97.7)
By using a public toilet	168 (98.8)
Casual contacts (hugging or touching) with an HIV-infected person	167 (98.2)

Table 3: Pharmacists' knowledge towards the preventive measures of HIV infection

Statements	Correctly Answered, n (%)
Avoid taking illicit drugs/use of intravenous drug	158 (92.9)
By avoiding sharing needles and syringes	170 (100.0)
Having sex with only one faithful, uninfected partner	167 (98.2)
Using condoms during sexual intercourse	167 (98.2)
Treating STDs promptly	146 (85.9)
Screening donated blood before transfusion	169 (99.4)
Not sharing swimming pools or toilet with an infected person	157 (92.4)
Not sharing food with an infected person	158 (92.9)
Isolating people living with HIV/AIDS	164 (96.5)
Do not stay with infected person in the same house	164 (96.5)
Do not have casual contact with infected person	163 (95.9)
Avoiding mosquito bites	152 (89.4)

Pharmacists' perceptions towards the decision to change treatment regimen for HIV/AIDS patients

The median (IQR) score of respondents on decision to change regimens were 7.00(2.0) [maximum score = 8.00]. Nearly all respondents agreed that treatment regimen should be changed when patient is unable to tolerate adverse reactions of the regimen (97.1%), and when HIV-viral load increases (95.3%). Two-fifth of the respondents thought that the treatment regimen should not be switched based on the factor that the patient could not afford the treatment cost (40.6%) (Table 4).

Pharmacists' attitudes towards people living with HIV/AIDS

Two-thirds of the respondents had negative (61.8%) and very negative attitudes (5.3%) towards PLWHA (Figure 1), with median (IQR) score = 8.00(3.0) [maximum score = 12.00]. Half of the respondents revealed that they were not willing to live with HIV/AIDS-positive people in the same house (51.8%). Almost two-fifth of the respondents were not willing to take care of HIV/AIDS-positive patients (41.2%). About one-third of the respondents confessed that they did not feel comfortable working together with a colleague who is HIV-positive (31.2%) (Table 5).

Table 4: Pharmacists' perceptions towards the decision to change treatment regimen for HIV/AIDS patients

Statements	Yes, n (%)
Patient's compliance is poor	154 (90.6)
Patient cannot tolerate adverse reactions of the regimen	165 (97.1)
Viral load increases	162 (95.3)
CD4 T-cell count decreases	144 (84.7)
Patient experiences opportunistic infections	143 (84.1)
Drug interactions with other medicines	160 (94.1)
Patient cannot afford the treatment cost	101 (59.4)
Patient is found to be pregnant	146 (85.9)

Table 5: Pharmacists' attitudes towards people living with HIV/AIDS

Statements	Yes, n (%)
Do you feel comfortable about counselling HIV/AIDS patients?	135 (79.4)
Do you feel comfortable to work together with a colleague who is a HIV/AIDS patient?	117 (68.8)
Are you willing to live with people having HIV/AIDS in the same house?	82 (48.2)
Do you feel empathetic towards people living with HIV and AIDS?	161 (94.7)
Are you willing to take care of patients who have HIV/AIDS?	100 (58.8)
Do HIV/AIDS patients deserve free treatment?	133 (78.2)

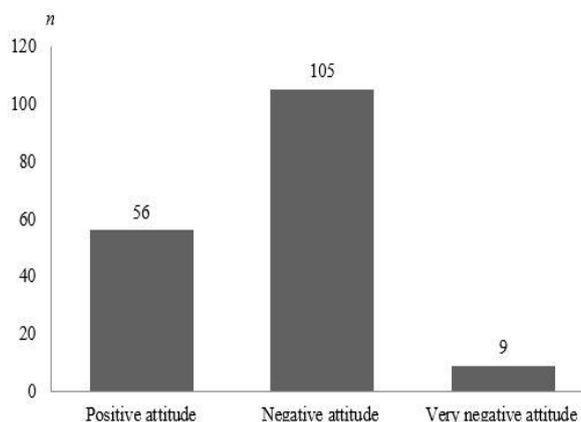


Figure 1: Pharmacists' attitudes towards PLWHA

Multivariate logistic regression was performed to identify the significant independent factors associated with respondents' negative attitudes towards PLWHA (**Table 6**). Respondents worked at community pharmacies were 0.87 times less likely to have negative attitudes towards PLWHA than respondents who practiced in other workplaces (Adj OR=0.125; 95%CI=0.025-0.623; $p=0.011$).

Discussion

In the general knowledge assessment section, the potential of HIV transmission through kissing is the most misunderstood. This trend of misconceptions were similar to the study by Khan and Baig (2013) where up to 89.3% of respondents believe that kissing HIV-infected person contributed to HIV transmission. WHO stated that "HIV can be transmitted through the exchange of body fluids from infected people, such as blood, breast milk, semen, and vaginal secretions. Individuals cannot become infected through kissing, hugging, shaking hands, or sharing personal objects, food or water" (World Health Organisation, 2019). The hypotonicity of saliva is believed to be protective against HIV transmission by inactivating HIV-transmitting leucocytes, preventing attachment of the HIV-transmitting leucocytes to the mucosal epithelial cells, and lastly HIV production (Baron, Poast, & Cloyd, 1999).

Another highly prevalent misconception on HIV prevention among recruited respondents is that HIV cannot be prevented by treating sexually transmitted diseases (STDs) promptly. This is different from the findings of Khan and Baig (2013), where most pharmacists' misconception was avoiding taking illicit drug/ use of intravenous drug to prevent HIV transmission. Nevertheless, up to 29.3% of respondents in Kedah also believed that treating STDs promptly will not prevent HIV transmission (Khan & Baig, 2013). The risk of HIV transmission through sexual contact were reported to increase by five-to-ten folds in people with ulcerative STDs (Sahasrabudde & Vermund, 2007). Disruption of the integrity of epithelial mucosa by ulcerative STDs, facilitates the contact of HIV with lymphatic and circulatory systems (Cohen, 2004; Wasserheit, 1992). For inflammatory and exudative STDs, the risk of HIV transmission through sexual transmission is increased by two-to-five folds (Sahasrabudde & Vermund, 2007), as the infection and inflammation is associated with recruitment of urethral or cervical discharge filled with HIV-susceptible leucocytes in large volume (Cohen, 2004; Wasserheit, 1992). Management of STDs was reported to achieve reduction of 38% in incidence of HIV-infection in Tanzania over two years period (Grosskurth *et al.*, 1995). Another study in Malawi had also shown that treatment of STDs reduced the genital tract HIV-viral loads, thereby leading to infectiousness index reduction and lowering of transmission probability (Cohen *et al.*, 1997).

Most respondents agreed that the treatment regimen of HIV/AIDS patients should be modified only in the event of intolerable adverse reactions. Again, our finding is consistent with the earlier study conducted by Khan and Baig (2013). In instances of moderate to severe adverse events, the Malaysian Consensus Guidelines on Antiretroviral Therapy 2017 (Malaysian Society for HIV Medicine, 2017) recommend substituting the causative drug with another of the same ART class, but of different toxicity profile. In our study, we also found that the statement that most respondents disagreed on was changing of treatment regimen is necessary if the patients were unable to afford the treatment cost. In the study by (Khan & Baig, 2013), it was found that up to three-quarter of respondents did not agree to change treatment regimen on the grounds of treatment cost. However, cost of medication is a true obstacle in HIV treatment and medication adherence as reported in a qualitative study conducted in South Africa (Hardon *et al.*, 2006). In a meta-analysis, Ivers, Kendrick, & Doucette (2005) found cost of treatment to be an important determinant of adherence towards ARTs in resource-poor settings. These studies provide insights that cost of treatment should be considered when deciding on treatment regimen. In Malaysia, HIV-positive patients who seek treatment in government healthcare facilities have free access to first-line ARTs. In the state of Kelantan, the free-of-charge treatments are extended to alternative choices or second-line treatments. Therefore, the affordable healthcare system in Malaysia may have led to the local practicing pharmacists to have such perceptions on treatment costs.

We found that two-thirds of the respondents in Kelantan had negative attitudes towards PLWHA, similar to the findings in the study by Khan and Baig (2013), which reported that a majority of the hospital pharmacists in Kedah also had negative attitudes towards PLWHA. Discriminatory attitudes of pharmacist against PLWHA were also being reported in Nigeria (Ubaka, Adibe, & Ukwe, 2014). Nevertheless, pharmacists in Iraq showed positive attitude towards PLWHA in providing care and treatment (Allela, Shareef, & Ismael, 2017). We observed that our respondents were reluctant to have social and casual contact with PLWHA, but generally had empathy towards them. Despite having high scores of knowledge in the causes and preventive measures of HIV/AIDS, and awareness that casual and social contact with PLWHA will not cause HIV transmission, the respondents were unable to apply their theoretical knowledge in daily practices towards PLWHA with negative attitudes. In fact, we found that there was no significant association between knowledge scores and attitudes towards PLWHA in this study. This finding is in contrast to another study by Balfour *et al.* (2010) which reported that pharmacists and health science students with better HIV knowledge were associated with lower HIV stigma in South America.

Table 6: Independent factors affecting pharmacists' attitudes towards people living with HIV/AIDS

Variables	Positive (<i>n</i> =56)	Negative (<i>n</i> =114)	Univariate Logistic Regression		Multivariate Logistic Regression	
	<i>n</i> (%)	<i>n</i> (%)	OR (95%CI)	<i>p</i> value	Adj OR (95%CI)	<i>p</i> value
Age (years)						
21 - 30	28 (50.0)	69 (60.5)	1.533 (0.805-2.921)	0.194	-	-
31 - 40	21 (37.5)	39 (34.2)	0.936 (0.479-1.829)	0.847	-	-
41 - 50	6 (10.7)	5 (4.4)	0.495 (0.137-1.792)	0.284	-	-
50 - 60	1 (1.8)	1 (0.9)	0.515 (0.032-8.398)	0.641	-	-
Gender						
Male	11 (19.7)	25 (21.9)	1.149 (0.519-2.544)	0.732	-	-
Female	45 (80.3)	89 (78.1)	0.870 (0.393-1.926)	0.732	-	-
Race						
Malay	50 (89.3)	107 (93.8)	1.834 (0.586-5.741)	0.297	-	-
Chinese	4 (7.1)	7 (6.2)	0.545 (0.174-1.706)	0.297	-	-
Academic Qualification						
Degree	53 (94.6)	106 (92.9)	1.333 (0.340-5.233)	0.680	-	-
Master	3 (5.4)	8 (7.1)	0.750 (0.191-2.943)	0.680	-	-
Job Experience (years)						
< 1	2 (3.6)	12 (10.5)	3.176 (0.686-14.71)	0.139	-	-
1 - 3	10 (17.8)	27 (23.7)	1.359 (0.604-3.061)	0.459	-	-
4 - 7	24 (42.9)	39 (34.2)	0.693 (0.360-1.336)	0.274	-	-
8 - 11	7 (12.5)	18 (15.8)	1.312 (0.514-3.355)	0.574	-	-
11 - 13	3 (5.4)	10 (8.8)	1.679 (0.448-6.425)	0.436	-	-
> 14	10 (17.8)	8 (7.0)	0.347 (0.129-0.936)	0.037	-	-

Variables	Positive	Negative	Univariate Logistic Regression		Multivariate Logistic Regression		
	(n=56)	(n=114)	OR (95%CI)	p value	Adj OR (95%CI)	p value	
	n (%)	n (%)					
Place of Practice							
Government Hospital	28 (50.0)	76 (66.7)	2.000 (1.041-3.841)	0.037	-	-	
Government Health Clinic	16 (28.6)	27 (23.7)	0.848 (0.408-1.764)	0.660	-	-	
Pharm. Service Division	3 (5.4)	7 (6.1)	0.981 (0.236-4.078)	0.979	-	-	
Community Pharmacy	7 (12.5)	2 (1.7)	0.125 (0.025-0.623)	0.011	0.125 (0.025-0.623)	0.011	
Academic Institution	2 (3.5)	0 (0.0)	-	>0.999	-	-	
Private Hospital/ Clinic	0 (0.0)	1 (0.9)	-	>0.999	-	-	
Pharm. Industrial	0 (0.0)	1 (0.9)	-	>0.999	-	-	
No of HIV patients encountered past 1 year							
None							
1 – 20	12 (21.4)	27 (23.7)	1.138 (0.527-2.459)	0.742	-	-	
21 – 50	35 (62.5)	71 (62.3)	0.991 (0.512-1.918)	0.978	-	-	
> 50	5 (9.0)	9 (7.9)	0.874 (0.279-2.743)	0.818	-	-	
	4 (7.1)	7 (6.1)	0.850 (0.238-3.036)	0.803	-	-	
Knowledge of HIV/AIDS [median (IQR)]	24.00 (2)	24.00 (2)	0.862 (0.703-1.056)	0.152	-	-	
Knowledge on causes of HIV/AIDS [median (IQR)]	12.50 (1)	13.00 (2)	0.861 (0.641-1.156)	0.319	-	-	
Knowledge on preventive measures of HIV/AIDS [median (IQR)]	12.00 (1)	12.00 (1)	0.788 (0.559-1.111)	0.788	-	-	

Here, it seems that education on scientific matters may not be sufficient to achieve practices changes, and that attitudes and cultural beliefs should also be addressed in future educational programs (Reis *et al.*, 2005).

HIV-related discriminations and its related problems is prevalent throughout the world, especially in developing countries with rich cultural, moral, and religious values - such as Malaysia. HIV/AIDS cases were often thought to be linked to moral improprieties, such as drug use, prostitution, heterosexual promiscuity, and homosexual behaviour. HIV is also believed to be highly contagious and may pose a threat to the community (Wong & Nur Syuhada, 2011). The life-threatening nature of HIV/AIDS may also lead to the negative attitudes among pharmacists towards PLWHA (Allela *et al.*, 2017). In addition, as majority of our respondents were Malays, and up to 68.2% ($n=107$) of the Malays had negative attitude towards PLWHA, these negative attitudes may be associated with cultural-related conception. The burial rite of Muslim is done with bleach for known HIV-infected people, which may reinforce the societal stigma and individual anxiety towards PLWHA (Fadzil, Othman, & Mustafa, 2016). With these concerns, our respondents may refuse to take any unnecessary risks that may expose oneself in HIV transmission risk through accidental injuries or accidental transmission of infected body fluids through daily contact.

In this study, respondents working in community pharmacies had significant positive attitudes towards PLWHA. In the study that only focused in hospital pharmacists, Khan and Baig (2013) reported that 86.6% of the hospital pharmacists in Kedah had negative attitudes towards PLWHA, but the reasons for such findings were not further investigated. A study conducted among community pharmacists in India by Gupta *et al.* (2010) found that majority of the pharmacists had senses of professional obligation towards PLWHA and were not worried about potential HIV exposure during medications dispensing to HIV-positive patients. However, the surveyed community pharmacists were not actively involved in HIV services as about two-thirds of pharmacists revealed that they did not frequently encountered HIV-positive patients (Gupta *et al.*, 2010). This similar situation may occur in our community pharmacy settings, where there is minimal involvement of the community pharmacists in providing care towards PLWHA, as most of the HIV-positive patients were managed in hospitals. As most of the HIV/AIDS patients with presence of opportunistic infections were treated in hospitals, this may have led to the fear of hospital pharmacists in contacting with HIV/AIDS patients compared to the community pharmacists, for example concerns for risk of exposure to contagious opportunistic infections such as occupationally-acquired tuberculosis (Engelbrecht *et al.*, 2019).

There are some limitations and bias in this study. Some degree of social desirability bias, which may affect participants' response according to ethics of pharmacy practices, may be present in our study. The environment to complete the questionnaires were beyond our control. We were also unable to ensure that the respondents did not search for references to answer the questionnaires, or whether their responses were influenced by peers when answered in groups. A positive response bias is also likely to be present, as pharmacists with more knowledge on HIV/AIDS were more likely to fill in the questionnaire, which may yield non-representative high scores (Domnich *et al.*, 2015). As the number of respondents included in this study were unable to achieve the recommended sample size, our results may not statistically represent the pharmacist population in Kelantan. Lastly, this study was conducted in Kelantan, which made up 10.3% of the national HIV population (Ministry of Health Malaysia, 2018); free ARTs were provided to all HIV-positive patients; lesser distribution of community pharmacies compared to other states (Pharmaceutical Services Division Ministry of Health Malaysia, 2011); and due to inherent geographical distribution of the Malay race, there were also more Malay pharmacists in the state, as reflected in the high proportion in the study respondents. Hence, the findings on this study may not necessarily be generalizable to other regions and settings in Malaysia. Further studies may also be expanded to the whole Malaysia to identify the pharmacists' knowledge, perception and attitudes towards PLWHA in Malaysia.

In the future, education and sharing sessions may be carried out to enhance the pharmacists' knowledge on HIV/AIDS, focusing on the common misconceptions. As pharmacists' high knowledge scores on causes and prevention of HIV/AIDS were not associated with the high rates of negative attitudes, it is important to investigate further the concerns of the pharmacists towards PLWHA. As stigma and discrimination reduces the quality of treatment (Yang, Zhang, Chan, & Reidpath, 2005) and affect the self-esteem of HIV-positive patients (Surlis & Hyde, 2001), efforts to assist pharmacists in overcoming their uneasiness when dealing with PLWHA will contribute positively towards future HIV disease control strategies.

Conclusion

In conclusion, several key misconceptions towards the causes of HIV/AIDS, preventive measures of HIV/AIDS transmission, and the necessity in changing treatment regimen when needed were identified among pharmacists in Kelantan, Malaysia. Despite having good disease related knowledge, most pharmacists in Kelantan present negative attitudes towards PLWHA while working in a community setting was significantly associated with more positive attitudes. Future studies should identify the causes of such

negative attitudes; and feed educational program strategies as part of the efforts to improve existing disease management measures attitudes.

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Conflict of Interest

None.

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