

Evaluation of knowledge, attitudes, and perceptions on halal pharmaceuticals among pharmacy students from Malaysian private universities

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ABSTRACT

Religious beliefs may affect medicine use and patient adherence. Therefore, consideration should be given to the patient's religious beliefs before prescribing drugs or treatment. The Muslim population around the world is becoming more aware of their options and requesting pharmaceutical products containing only halal ingredients. Thus, education on halal pharmaceuticals, especially for pharmacy students, is fundamental to ensure the right information is communicated effectively to patients. This survey was carried out among fourth-year pharmacy students in private universities to assess their knowledge, attitude, and perception of halal pharmaceuticals. A cross-sectional study was carried out using a structured, self-administered questionnaire from November 2019 to February 2020. The mean score for perception knowledge and attitude was 11.37 ± 3.86 , 32.9 ± 4.86 , and 31.94 ± 4.39 , respectively. There was a significant, positive, moderate correlation between knowledge and attitude ($p < 0.001$, $r = 0.433$), and knowledge and perception ($p < 0.001$, $r = 0.369$). A significant, positive, and strong correlation was found between attitude and perception ($p < 0.001$, $r = 0.732$). Results showed that respondents have good knowledge, attitude, and perception toward halal pharmaceuticals. Topics on halal pharmaceuticals should be included in the existing curriculum to improve halal awareness among pharmacy students. Momentous connections were found between attitude and knowledge, knowledge and perception, and attitude and perception.

Keywords: Halal pharmaceuticals, Knowledge, Attitude, Perception, Pharmacy, Education

Introduction

The world is a vibrant habitation full of different cultures, beliefs, and religious obligations. How these affect and influence attitudes toward planning, providing, and receiving healthcare necessitates healthcare professionals being aware of and sensitive to the various perspectives that patients bring to ethical decision-

making. Besides, the pharmaceutical industry and healthcare system have advanced rapidly throughout the years to cater different needs of patients. Muslim patients have made a significant impact in the healthcare industry by demanding medication to suit their beliefs and accommodating their needs [1]. The emergence of halal pharmaceuticals gives Muslims an informed choice to choose the most appropriate medicines accordingly. It is a Muslim's right to have halal and non-halal (impurity) medication, be informed of medication, choose medication, and finally, the right to give consent for the usage of non-halal medicines [2].

In Malaysia, several guidelines were published to facilitate the manufacturing and usage of halal pharmaceuticals in practice. For example, MS2424:2019 Halal Pharmaceuticals Standard – General Guidelines rapidly gained universal acceptance. In

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pharmacy practice, "Guidelines in The Use of Medication from Islam Perspective" (*Garis Panduan Penggunaan Ubat-Ubatan Dari Perspektif Islam*) and "Guidelines in The Use of Medication Contains Non-Halal Sources" (*Garis Panduan Penggunaan Ubatan Dengan Kandungan Tidak Halal*) were established to address the needs and concerns of Muslim patients. Besides, in countries such as England and Australia, healthcare sectors have come up with specific guidelines when attending to Muslim patients [3, 4].

As more halal pharmaceutical products are manufactured, healthcare professionals must arm themselves with the knowledge necessary to assist their Muslim patients. As one of the first-line healthcare providers, pharmacists must be well-versed in halal pharmaceuticals, when to dispense them, and how to handle their needs and usage. Because pharmacists are in charge of consulting with and educating patients about medication, they must provide accurate information to ensure that patients understand it. A pharmacist will be more prepared to serve the community and offer better consultation and services if they know Halal or non-Halal ingredients and practices. Pharmacists may also be able to provide alternatives to non-halal medications. Hence, future pharmacists must be well-versed in these aspects of Halal pharmaceuticals and communicate effectively with patients.

Previous KAP studies on halal pharmaceuticals were done among the public [5], academicians [6], general medical practitioners and hospital doctors [7-9], and also community pharmacists [10]. This research aims to assess the knowledge, attitude, and perception of halal pharmaceuticals among pharmacy students in Malaysia. Data gathered will enable us to have insights into the level of halal awareness amongst pharmacy students, thereby improving the existing curriculum. This is important to prepare our students to become competent pharmacists.

Materials and Methods

Study design

A cross-sectional study was conducted with structured, validated, and self-administered questionnaires (printed and online). Data were collected among the fourth-year undergraduate pharmacy students from 13 private universities offering Bachelor of Pharmacy courses accredited by the Pharmacy Board of Malaysia from October 2019 to February 2020. Thirty-two questions were adapted and modified from the previous study distributed over four sections; demographics, knowledge, attitude, and perception [5-10].

Questionnaire structures

The questionnaire was distributed into four divisions, namely parts A, B, C, and D, which were used to assess the respondent's demographic data, knowledge, attitude, and perception, respectively.

The first section involves collecting the respondent's demographic data, such as gender and religion. Information on

currently available subjects' thoughts on halal concepts was also assessed in this section. Details such as the name of courses, type of topic, and teaching hours need to be written in the place provided, and the data were summarised in the results.

The second section of the questionnaire evaluates the respondent's knowledge of the concept of halal. There are a total of 16 questions and statements. The respondents were required to choose between yes, no, or not sure as their response.

The respondents' attitudes and perceptions toward halal pharmaceuticals were assessed in the third and fourth sections of the questionnaire. There was a total of eight questions in each section analyzed using a five-point Likert Scale; "Strongly Agree" (SA), "Agree" (A), "Neutral" (N), "Disagree" (D), and "Strongly Disagree" (SD).

Scoring method

As for the scoring method, in the second section, "yes" statements were awarded one (1) mark, "no" statements were given zero (0) marks, and "not sure" responses were also given zero (0) marks. For the third and fourth section, the Likert Scale was scored as follow: "Strongly Agree" = five (5) marks; "Agree" = four (4) marks; "Neutral" = three (3) marks; "Disagree" = two (2) marks and "Agree" = one (1) mark. Hence a minimum and maximum score for knowledge, attitude, and perception could be from 0 to 16, 8 to 40, and 8 to 40, respectively. In the end, a total possible score of 96 can be obtained for KAP.

Data analysis

Data gathered were analyzed with SPSS version 25 (IBM Corporation, America). For Part A, analysis was done by using descriptive statistics. As the data obtained were not normally distributed, non-parametric tests were used to conduct the examination. Chi-square (χ^2) and Fisher's Exact Test were used to test the association between the demographic factors and knowledge, attitude, and percept score.

For Part C and D, the Likert scale was used to obtain data. For analysis purposes, responses that show any degree of the agreement were grouped as positive responses, while reactions that lead to any degree of disagreement were grouped as negative responses [11]. Spearman's correlation was applied to analyze the relationship between knowledge-attitude, knowledge-perception, and attitude-perception of the respondents. A p-value of 0.05 or less ($p < 0.05$) was accepted as statistically significant.

Pilot study

A pilot study was carried out before data collection among 35 fourth-year pharmacy students. The pilot study included 28 females (80%) and 7 males (20%). Responses from different religion were obtained, namely Buddhist (n=15, 42.9%), Muslim (n=17, 48.6%) and Hindu (n=3, 8.6%). Students' feedback was obtained from the pilot study to validate and

further improve the questionnaire. The reliability of the questionnaire was tested using Cronbach's Alpha. Part B (knowledge), Part C (attitude), and Part D (perception) of the questionnaire obtained the reliability score of 0.74, 0.87, and 0.80, respectively, which shows that the questions in the specific parts are internally consistent.

Results and Discussion

This study assessed fourth-year pharmacy students' knowledge, attitude, and perception from private universities in Malaysia on halal pharmaceuticals. Fourth-year students were the selected study population as they had almost completed the pharmacy program curriculum; thus, it was believed that they would

experience enough exposure and receive adequate knowledge and training to begin their career as pre-registered pharmacists. A total of 259 respondents from 13 private universities participated in the survey.

Demographic characteristics

Data related to demographic characteristics are summarised in **Table 1**. Almost 100% of the subjects (n=257, 99.23%) submitted complete questionnaires; two questionnaires were rejected due to a blank consent form, yielding a sample of 257. The majority of the respondents (n=196, 76.3%) stated that no subjects/topics related to halal pharmaceuticals were taught in their respective universities. For those who stated yes (n=61, 23.7%), their responses are summarized in **Table 2**.

Table 1. Demographic characteristics of respondents (n=257)

Characteristics	Demographic Characteristics	Frequency, n (%)
Age	21-22	143 (55.6%)
	23-24	99 (38.5%)
	25-26	13 (6.1%)
	27-28	1 (0.4%)
	29-30	1 (0.4%)
Gender	Female	196 (76.3%)
	Male	61 (23.7%)
Religion	Buddhist	120 (46.7%)
	Muslim	64 (24.9%)
	Christian	50 (19.5%)
	Hindu	13 (5.1)
	Others	10 (3.9%)
Presence of Halal related topic in curriculum	No	196 (76.3%)
	Yes	61 (23.7%)

Table 2. Summary of responses regarding halal courses being conducted (n=61)

Response	Number of respondents n (%)
Good Industrial Practice Course: Standard MS2424:2012 - General Guidelines for Halal Pharmaceuticals.	19 (31.15%)
Pharmaceutical Technology	11 (18.05%)
Pharmaceuticals	11 (18.05%)
Quality Assurance	3 (4.92%)
Co-curricular Activities	-
Industrial Placement/Pharmaceutical Industry Training	4 (6.56%)
Poster Presentation	3 (4.92%)
Community Outreach Program	1 (1.64%)

Knowledge towards the concept of halal

In this study, students' knowledge of halal pharmaceuticals is perceived to be good, as respondents score relatively well, with more than 199 respondents (77.4 %) scoring above 50% on all questions. The frequency distribution of respondents' knowledge regarding halal pharmaceuticals is tabulated in **Table 3**. the mean

knowledge score obtained was 11.37 ± 3.86 , Out of the maximum potential score of 16. Looking closely at the questions, however, most of the students were able to answer questions related to the fundamental knowledge of halal. Questions about halal drugs or products containing non-halal substances, on the other hand, are less likely to be correctly answered (52.6%).

Table 3. Respondent's knowledge of the concept of halal

Statements	Responses (n)		*p-value
	Yes	No	
Are you aware of the term "halal" and its definition?	243(96.6%)	14 (5.4%)	-
Are you aware of the term "Haram" and its definition?	222 (86.4%)	35 (13.6%)	p=0.02
Are you aware of the term "halal pharmaceutical"?	214 (83.3%)	43 (16.7%)	p=0.013
Do you know that there is a specific guideline for halal pharmaceuticals?	152 (59.1%)	105 (40.9%)	p=0.002
Do you know that Muslim patients need halal medicines?	211 (82.1)	46 (17.9%)	p=0.01
Do you know that dead animals, blood, pork, and alcohol are Haram for Muslims to use in any form? (Food, Medicine, etc.)	223 (86.8%)	34 (13.2%)	p=0.004
Do you know that resources are available to offer halal alternatives to the non-halal drug?	157 (61.1%)	100 (38.9%)	p<0.001
Do you know that you need to take the patient's consent before dispensing any medicine which has non-halal content?	177 (68.9%)	80 (31.1%)	p<0.001
Halal Pharmaceuticals contain ingredients permitted under the Shariah Law.	161 (62.6%)	96 (37.4%)	p<0.001
Halal Pharmaceuticals do not contain any parts or products of animals/humans prohibited by the Shariah Law.	179 (69.6%)	78 (30.4%)	p<0.001
Halal Pharmaceuticals contain parts or products of animals slaughtered under the Shariah Law.	140 (54.5%)	117 (45.5%)	p<0.001
According to the Shariah Law, Halal Pharmaceuticals are products that do not contain naj*.	161 (62.6%)	96 (37.4%)	p<0.001
Do you know that some capsules are made from gelatine which may be derived from porcine?	236 (91.8%)	21 (8.2%)	-
Do you know that alcohol content in medicines exceeding a certain percentage is haram?	166 (64.6%)	91 (35.4%)	p=0.021
Do you know that the Malaysian National Fatwa Council has stated that it is permissible to inject highly purified insulin made from porcine in extremely needed situations?	127 (49.4%)	130 (50.6%)	p<0.001
Halal is a form of Quality Assurance.	152 (59.1%)	105 (40.9%)	p=0.01

*p-value of Chi-Square Test for the association between religion and respective statements.

The attitude of fourth-year pharmacy students towards halal pharmaceuticals

The frequency distribution of the respondents' attitudes is presented in **Table 4**. Out of the maximum possible score of 40, the mean score for attitude was 32.9 ± 4.86 . More than 98.4% of the respondents scored 50% and above, which shows a positive attitude towards halal pharmaceuticals.

Table 4. Respondents' attitudes regarding halal pharmaceuticals

Statements	Respondents (n%)					*p-value
	SA	A	N	D	SD	
I will discuss with patients about forbidden/Haram ingredients of drugs.	104 (40.5%)	100 (38.9%)	42 (16.3%)	9 (3.5%)	2 (0.8%)	p=0.02
I have a moral obligation to disclose the derivation of non-halal ingredients to the patient. (e.g., alcohol in syrups/elixirs and gelatine in capsules)	109 (42.4%)	91 (35.4%)	47 (18.3%)	6 (2.3%)	4 (1.6%)	-
I will take consent from patients if I know the drug is non-halal.	146 (56.8%)	90 (35.0%)	17 (6.6%)	2 (0.8%)	2 (0.8%)	p=0.048
I will consider the patient's religious beliefs when designing a treatment regimen.	130 (50.6%)	105 (40.9%)	20 (7.8%)	-	2 (0.8%)	-
I will make an exertion to search for any available halal alternatives.	104 (40.5%)	117 (45.5%)	31 (12.1%)	4 (1.6%)	1 (0.4%)	p=0.024
I will educate the patient regarding halal ingredients of medicines.	103 (40.1%)	117 (45.5%)	29 (11.3%)	7 (2.7%)	1 (0.4%)	-
I prefer halal medicines in my practice.	49 (19.1%)	63 (24.5%)	124 (48.2%)	17 (6.6%)	4 (1.6%)	p<0.001
I will recommend the purchase of halal alternatives.	59 (23%)	88 (34.2%)	99 (38.5%)	7 (2.7%)	4 (1.6%)	p<0.001

*p-value of Chi-Square Test for the association between religion and respective statements.

Perception of fourth-year pharmacy students towards halal pharmaceuticals

There was a total of eight questions that evaluated the respondents' perceptions. The frequency distribution of the

respondents' attitudes is presented in **Table 5**. Out of the maximum possible score of 40, the mean score obtained was 31.94 ± 4.39 , with 98% of the respondents scoring more than 50%. This shows that there is a positive perception towards halal pharmaceuticals.

Table 5. Respondents' perception regarding halal pharmaceuticals

Statements	Respondents (n%)					*p-value
	SA	A	N	D	SD	
Patients/consumers have the right to ask about the halal status of the medicine.	157 (61.1%)	91 (35.4%)	5 (1.9%)	2 (0.8%)	2 (0.8%)	p=0.011
Pharmaceutical companies should clearly label medication packaging if it contains non-halal ingredients.	157 (61.1%)	78 (30.4%)	16 (6.2%)	3 (1.2%)	3 (1.2%)	-
Before prescribing medication, doctors should consider patient's/consumer's religious beliefs.	127 (49.4%)	99 (38.5%)	23 (8.9%)	5 (1.9%)	3 (1.2%)	-
I think halal medicines are expensive.	8 (3.1%)	35 (13.6%)	163 (63.4%)	33 (12.8%)	18 (7.0%)	-
Educating the public about halal medicine is essential.	86 (33.5%)	109 (42.4%)	55 (21.4%)	4 (1.6%)	3 (1.2%)	p<0.001
Patients should be informed about haram ingredients in medicines.	110 (42.8%)	122 (47.5%)	20 (7.8%)	2 (0.8%)	3 (1.2%)	p=0.031
Religious leaders should be involved in determining halal medicines.	67 (26.1%)	63 (24.5%)	84 (32.7%)	23 (8.9%)	20 (7.8%)	p<0.001
Subject regarding halal pharmaceuticals needs to be added to the course.	68 (26.5%)	89 (34.6%)	77 (30.0%)	16 (6.2%)	7 (2.7%)	p<0.001

*P-value of Chi-Square Test for the association between religion and respective statements

A focused group discussion conducted in earlier research highlighted that pharmacists and medical officers face difficulties in responding to the request of patients or consumers to know the halal status of medicines supplied [12]. With the rise of the halal pharmaceutical market and the demand for halal medicine from the Muslim community, it is time for qualified personnel who dispense and prescribe medication to be well educated in this field, including pharmacists. Besides, the study also noted that the majority stated that there were no subjects or topics related to halal pharmaceuticals being offered in the curriculum. Similarly to another study conducted by Sadeeqa *et al.* (2013), which assessed the knowledge, attitude, and perception of academicians from the pharmacy school, medical school, and dental school of universities in Malaysia is, the majority of the academicians agreed that no halal pharmaceuticals topics were covered as a part of course contents in the respective institutions [6].

It is indeed challenging to date to find standardized content in pharmacy or medicine curriculums that aim to equip future pharmacists and doctors with knowledge regarding halal and non-halal animal sources, processing and manufacturing techniques, and halal excipients [13]. Numerous explanations have been acknowledged as to why this topic is not offered as the foremost subject, including a lack of proper understanding of what halal pharmaceutical is all about, a lack of adequate knowledge in the process of developing halal pharmaceutical products, a lack of educators involved in research and services on halal pharmaceutical products, a lack of standardization on halal pharmaceutical products around the world, and a lack of interest among educators and students [14].

Based on the findings, more than 40% of the respondents were not aware of the matters related to halal guidelines and fatwa rulings. Currently, there are a total of three policies related to halal pharmaceuticals. These include Standard Malaysia MS2424:2019-General Guidelines for Halal Pharmaceuticals, Guidelines of Usage of Medicine Containing Forbidden Materials, and Guidelines for Usage of Medicine from the Perspective of Islam. Pharmacists and physicians will be

introduced to the procedures that must be followed before treating Muslim patients with haram resources, as well as critical information that must be communicated to patients, with the help of these guidelines [15]. For example, there are a few situations where medicine containing haram materials can be used when the halal material cannot prevent harm from occurring to the patient or when the usage of the forbidden material is a necessity [16]. Many are also unaware that injecting highly purified insulin made from porcine in extremely needed situations is possible. This is following the Malaysian National Fatwa Council. However, it must be noted that informed consent is an important aspect when using medicine containing forbidden materials, as patients have the right to know and ask for their treatment. The name and indication of a particular medication must be known by the patient, followed by the reason for the usage of such medicine [2]. Students must be particularly aware of these points to enable proper counseling, dispensing, and usage of non-halal drugs for Muslim patients or consumers.

Correlation between knowledge, attitude, and perception

There is a significant, positive, moderate (0.3-0.7) correlation between knowledge and attitude ($r=0.433$, $p<0.001$) and knowledge and perception ($r=0.369$, $p<0.001$). There is a substantial, strong, positive connection between perception and attitude ($r=0.732$, $p<0.001$). This reflects that the better the respondents' knowledge of halal pharmaceuticals, the better their attitude and perception are toward halal pharmaceuticals.

A significant association between gender, age, and different testimonials concerning the halal concept can be found. Regarding how religion affects the students' response towards the statements was the most evident association observed. This result was as expected as religion strongly impacts daily activities. The regulations of each religion have their own set regarding what is and is not permissible. Similar findings were observed in previous research by Sadeeqa *et al.*, where medical practitioners' knowledge, attitude, and perception regarding halal

pharmaceuticals were highly associated with race and religion [7-9]. Muslim respondents would be more familiar with the definition of halal, haram, and Shariah Law rules. However, as healthcare providers, pharmacists should all be aware of halal concepts related to pharmaceutical use, and this should not be reliant on religion. This is because a pharmacist's patients or customers come from a variety of demographic backgrounds, particularly in multicultural and multiracial Malaysia.

The majority of respondents agreed that the halal labeling of pharmaceutical products is critical. However, when it comes to pharmaceutical products, patients and consumers cannot rely solely on the presence or absence of a halal logo. Currently, halal certification in Malaysia is voluntarily and not widely used in the pharmaceutical market [17]. On top of that, the halal logo was not permitted to be used on a certain class of pharmaceuticals as stipulated in the Drug Registration Guidance Document (DRGD) [18]. Nonetheless, the industry is required to comply with the National Pharmaceutical Control Bureau's (NPCB) labeling guideline, which requires manufacturers of pharmaceutical/supplement products to have a mandatory declaration of all active ingredients and excipients that use animal origin-based ingredients /gelatin for capsule case and 'softgel' on the product label. Therefore, patients or consumers rely on pharmacists or physicians to prescribe or suggest the best medicine without disregarding the religious beliefs and requirements of the patient or consumer [19]. It is essential always to consider the patient's or consumer's religious beliefs as this will influence treatment adherence and product of choice [20].

Hence, as a pharmacist, it is vital to educate and convey relevant or essential information to patients or consumers regarding halal medicine. To do so, pharmacists must be well equipped with knowledge regarding halal pharmaceuticals. The more informed pharmacists are, the more likely for pharmacists to ask and answer the right questions to ensure patients' or consumers' religious beliefs are taken into consideration. This can result in enhanced medication adherence as well as the promotion of trust between the health care professional and patient [21].

Conclusion

The fourth-year pharmacy students from private universities have good knowledge, attitude, and perception toward halal pharmaceuticals. However, when compared to the mean knowledge score, less than half of the studied populations scored well for their knowledge. Substantial correlations were found between attitude and knowledge, perception and knowledge. Inclusion of halal pharmaceuticals topics in the current curriculum for healthcare students, particularly pharmacy students, is highly recommended to improve overall halal awareness and equip them with adequate knowledge to serve the community by providing better consultation and services.

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