



KAP AMONG COMMUNITY PHARMACISTS REGARDING HALAL PHARMACEUTICALS: A CROSSECTIONAL ASSESSMENT

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ABSTRACT

There is a growing awareness amongst Muslims to avoid all items containing non-Halal ingredients. This sentiment has now progressed into the field of various medications too. This was a cross-sectional study using a structured, self-administered questionnaire to evaluate the knowledge, attitude and perception of community pharmacists regarding Halal pharmaceuticals. A total of 473 pharmacists working in community pharmacies were contacted through post to complete a structured self-administered questionnaire. Out of these, 175 pharmacists agreed to participate in the study (response rate = 37%). The results of this study revealed that the mean knowledge score was 7.94 (SD 1.42) (maximum possible score = 9), the mean attitude score was 36.65 (SD 6.96) (maximum possible score = 45), while the mean perception score was 51.9 (SD 6.07) (maximum possible score = 60). Our findings demonstrated that community pharmacists have a good knowledge, positive attitude and perception towards Halal pharmaceuticals.

Keywords: Halal foods and Pharmaceuticals, community pharmacists, Muslims, drug/medicine

INTRODUCTION

Halal is an Arabic word which means “lawful,” “permissible” under Islamic law ^[1-3]. The opposite of Halal is “Haram” which means “unlawful”, “prohibited”, “forbidden” ^[4-5]. Halal and Haram are universal terms that apply to all facets of life. However, this study will adapt these terms to refer only to pharmaceutical products that are deemed permissible for consumption of Muslims.

Halal is a well known word in the entire Muslim world. However as the Muslim population is expanding in other continents, this word has come to be used so commonly in the day to day life that even the non-

Islamic world has become cognizant of this terminology. This has resulted in Halal signs, at shops and food products, in America and Europe, catering for the religious beliefs and needs of the Muslim consumers.

In the holy Quran, God commands Muslims and all of mankind to eat of the Halal things. As Al Quran says “*O mankind eat of that which is lawful and wholesome and follow not the footsteps of the devil. Lo he is an avowed enemy of you*”^[6].

It is a firm belief of all Muslims that Allah is our creator and He is the best judge of what is right for us to consume and in what shape it should be done. However it is pertinent to mention that all old religions of the world like Hinduism, Judaism and Christianity also command certain religious restrictions and bindings on their followers in the consumption of foods and drinks^[7-8]. They may use other terminologies to define these restrictions but the main sentiment is the same. Therefore it would be pertinent to look into various items of human consumption, including pharmaceuticals, and their variants, to determine admissibility according to individual beliefs.

A drug/medicine is composed of a combination of active ingredients, and excipients. These substances are obtained from a variety of sources — animals, plants or synthetic origin. In case of animal source, it may be porcine, dead animal or blood. All these are Haram/forbidden for Muslims as mentioned in the Quranic verses cited below:

“He hath only forbidden you dead meat and blood and the flesh of swine and that eat on which any other name hath been invoked besides that of Allah, but if one is forced by necessity, without willful disobedience, Allah is forgiver and most merciful”^[9]

From the Quranic verses cited above it would imply that, not only, consuming Halal food but also consuming Halal medication is important because it forms a major part and behavior of being a good practicing Muslim. Consuming Halal medication is fundamental right of Muslims in terms of using healthcare facilities and services to maintain their health according to their faith and belief.

As majority of Malaysian population is Muslim, there are many government organisations which are playing active role to ensure provision of Halal foods and Pharmaceuticals In Malaysia. Halal medicine should be Halal not only regarding the ingredients but also regarding method of production. Department of Standards, Government of Malaysia have launched MS 2424:2010 (P): Standards for Halal Pharmaceuticals: These General Guidelines will address the entire pharmaceutical manufacturing and supply chain – from processing to handling, packaging, labelling, distribution, storage and display of medicines and health supplies. These are the first standards, of its kind, in the world^[10].

Much has been written on the subject of Halal and Haram in food, but references to Halal/Haram issue in pharmaceuticals, especially as to the origin of compounds, are undocumented, scanty and few. In fact the subject of Halal/Haram in pharmaceuticals has not been given due attention so far.

Though many government and non government organizations are playing active role to ensure provision of Halal foods and Pharmaceuticals to Muslims in Malaysia, to the best of our knowledge no study has been conducted, so far, to evaluate the perception of community pharmacists regarding Halal pharmaceuticals. Moreover, their knowledge on the issues surrounding Halal pharmaceuticals is not well explored. Therefore, the main objective of this study is to explore Malaysian community pharmacists’ perception and opinions of Halal pharmaceuticals and to identify barriers to dispense Halal pharmaceuticals. To achieve this objective, an extensive study was undertaken. A comprehensive questionnaire was prepared asking a variety of questions to assess the knowledge, attitude and perception of community pharmacists.

RESEARCH METHODS

Study design and study settings

A cross-sectional study design was adopted by using structured, self-administered, validated questionnaires. This was a postal survey conducted across Malaysia between 27 September 2012 and 7 November 2012. Systematic randomly selected, community pharmacies in Malaysia were included for sending questionnaires by post.

Questionnaire design and development

After extensive literature review, a self administered questionnaire was designed to conduct this study. The questionnaire was validated by a panel of experts which was composed of eight (8) senior academic researchers and was updated according to their recommendations. A pilot study was conducted to evaluate the reliability of the updated questionnaire on 47 pharmacists (which is 10% of the total study sample)^[11]. Cronbach's alpha was applied to test validity and internal consistency of the questionnaire^[12] and $\alpha=0.93$ was calculated. Final modifications were made based upon the results of pilot study.

The final questionnaire consisted of four parts. The first part of the questionnaire was on respondent's demographic information including age, gender, race, religion, nationality, country of basic educational degree, highest qualification and finally the experience. Second part had 9 statements to evaluate the knowledge of respondents towards Halal pharmaceuticals. Third part consisted of 12 statements for perception's evaluation of the respondents towards Halal pharmaceuticals and final part had 9 statements about the attitude of respondents about Halal pharmaceuticals. All questions were close ended, except one at the end for additional comments.

Scoring method for knowledge, attitude and perception (KAP)

For knowledge statements respondents were asked to choose "Yes" or "No" options. Correct answer (yes) was scored one (1) while incorrect answer (no) was scored zero (0). A five point Likert scale was used for perception and attitude statements (strongly agree=5, agree=4, neutral=3, disagree=2 and strongly disagree=1). Hence the minimum and maximum score for knowledge, attitude and perception could be 0 to 9, 1 to 45, 1 to 60 respectively. Total KAP score could be 114.

Ethical consideration

Ethical approval to conduct this study was taken from a committee called "Joint Ethics Committee of School of Pharmaceutical Sciences, Universiti Sains Malaysia and Hospital Lam Wah Ee on Clinical Studies". Approval was also taken from Ministry of Health Malaysia.

Sampling and data collection

A list of addresses of 1536 pharmacies registered with Malaysian Pharmacy Council was obtained from Ministry of Health. A study sample of 473 was calculated by ' Rao soft online sample size calculator with a confidence level of 95% and error margin of 5%'^[13-14]. For the distribution of questionnaires, "Guidelines and Standards for Survey Research" were followed. Postal questionnaires are widely used to collect data in health research and are often the only financially viable option when collecting information from large, geographically dispersed populations^[15]. 'Dillman's Total Design Method for mail Surveys' was used with some deviations^[16]. Questionnaires along with explanatory statement and a return self-addressed, postage paid envelope were sent to systematic randomly selected pharmacies by normal mail. A period of 2 weeks was allowed for return of the questionnaires from the first mail drop. First reminder was sent to all selected pharmacies, excluding those who responded during this period or the letters which were returned due to closed clinics or changed addresses^[17]. A period of 2 weeks, from the first reminder, was again allowed for return of the questionnaires. A second reminder was sent to all selected pharmacies, excluding those who had responded during this period. Responses were collected up to 15 days after the 2nd reminder mail drop. After a total of 6 weeks any further returns were not included in the study. Each time, an explanatory statement and a return self-addressed, postage paid envelope were sent. Postal paper stamps were supplied with the reply envelopes, as it was considered a better method of increasing response compared to franked prepaid business replies^[18]. No incentives were offered to any of the respondents^{[19][15]}. A total of 175 community pharmacists replied with a response rate of 37%. Those questionnaires which were returned unopened, stamped on the envelope "addressee has moved" or 'closed clinics' were excluded from the calculation of response rate^[20].

Data analysis

After data collection and screening, data was entered in SPSS version 18. After data cleaning, normality of data was checked by Kolmogorov-Smirnov test^[21]. Descriptive statistics (mean, standard deviation, frequency, percentage, median, inter quartile range) was applied to summarize the data. As data was not normally distributed, so non-parametric tests were applied^[21]. Chi-square Test and Fisher's Exact Test was applied to assess the association between demographic characteristics and knowledge, attitude and

perception scores. To find relationship between knowledge-attitude, knowledge-perceptions and attitude-perceptions of respondents, Spearman-correlation was applied ^[21]. P value of .05 or less was taken as statistically significant.

RESULTS

Respondents' demographics

Demographic characteristics of the respondents are depicted in Table-1. Mean age of the respondents was 39.96 years with Standard Deviation of ± 9.00 . Age ranges from 21-71 years. Gender wise 66(37.7%) of the respondents were male and 109 (62.3%) were females. Ethnicity wise, 88 (51.2%) were Malay, 78(45.3%) were Chinese, 6(3.5%) Indians and 3 (1.7%) did not mention their race. Regarding the religion, 88(50.9%) were Muslims, 26 (15%) Christians, 49 (28.3%) Buddhists, 3 (1.7%) Hindus and 7 (4%) from other religions. A large majority (n=157, 89.7%) had B. Pharm as their highest degree and only 18 (10.3%) had M.Pharm as highest degree.

Table 1: Descriptive characteristics of community pharmacists (n=175)

| Characteristics | Demographic Characteristics | Frequency (%) |
|----------------------------|------------------------------------------------------------------------------------------------------|---------------|
| Age (years) | 21-30 | 23(13.2) |
| | 31-40 | 76(43.7) |
| | 41-50 | 57(32.8) |
| | 51-60 | 14(8) |
| | 61 -70 | 3(1.7) |
| | >70 | 1(0.6) |
| Gender | Male | 66(37.7) |
| | Female | 109(62.3) |
| Race | Malay | 88(51.2) |
| | Chinese | 78(45.3) |
| | Indians | 6(3.5) |
| | Others | 3(1.7) |
| | | |
| Religion | Muslims | 88(50.9) |
| | Christians | 26(15) |
| | Buddhist | 49(28.3) |
| | Hindu | 3(1.7) |
| | Others (Sikh=2, Agnostic=1, Free thinker=1) | 7(4.0) |
| Country of basic degree | Malaysia | 127(72.6) |
| | Others (Australia=16, UK=19, Singapore=2, USA=1, Canada=1, India=1, Egypt=1, Japan=1, New zealand=1) | 48(27.4) |
| Working Experience (years) | 1-10 | 57(32.8) |
| | 11-20 | 84(48.3) |
| | 21-30 | 23(13.2) |
| | 31-40 | 9(5.2) |
| | >40 | 1(0.6) |
| | | |
| Highest degree | B.Pharm | 157(89.7) |
| | M.Pharm | 18(10.3) |
| Nationality | Malaysian | 173(99.4) |
| | Others | 1(0.6) |

Note: The frequencies and percentages are based on observed values; missing values are excluded ^[22].

Respondents’ knowledge regarding Halal pharmaceuticals

The frequency distribution of respondent’s knowledge regarding Halal pharmaceuticals is depicted in Table-2. Out of maximum possible score (equal to 9), mean knowledge score was 7.94 ± 1.42 (Table-5) which shows that study population has good knowledge regarding Halal pharmaceuticals. Majority of the respondents (96.5%) scored 50% and above. Results showed that all of the respondents (except one) were aware of the term ‘Halal’. On the other hand 149(85.1%) of the respondents were aware of the term ‘Haram’ showing a significant association with respect to age ($p=.004$), race ($p<.001$), religion ($p<.001$) and qualification (Fisher’s p value=.032). A total of 152(86.9%) respondents were aware of the term ‘Halal pharmaceutical’ showing a significant association with respect to race ($p<.001$) and religion ($p<.001$).

Table-2: Community pharmacists’ knowledge about Halal Pharmaceuticals (frequency distribution n=175)

| statements | Responses | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|
| | Yes n (%) | No n (%) |
| Are you aware of the term/ word ‘Halal’? | 174 (99.4) | 1 (0.6) |
| Are you aware of the term/word ‘Haram’? | 149 (85.1) | 26 (14.9) |
| Are you aware of the term/word ‘Halal pharmaceutical’? | 152 (86.9) | 23 (13.1) |
| Do you know that Muslim patients need Halal medicines? | 168 (96.6) | 6 (3.4) |
| Do you know that dead animals, blood, pork and Alcohol are Haram for Muslims to use in any form (food, medication etc)? | 162 (92.6) | 13 (7.4) |
| Do you know that ingredients of some drugs/medicines are derived from porcine and dead animals? | 164 (94.3) | 10 (5.7) |
| Do you know that resources are available to offer Halal alternatives of non-Halal drugs? | 130 (74.3) | 45 (25.7) |
| Do you know that it is ethical obligation for a practitioner to take consent from the patient before dispensing any medicine which has any non-Halal content? | 155 (88.6) | 20 (11.4) |
| Do you know that most of the Pharmacists are aware of the presence of potentially forbidden animal-derived ingredients in medicines? | 137 (78.7) | 37 (21.3) |

Note: The frequencies and percentages are based on observed values; missing values are excluded^[22].

A large majority (96.6%) knew that Muslim patients need Halal medicines showing a significant association with respect to respondent’s age ($p<.001$), race ($p=.037$), religion ($p=.001$) and qualification (Fisher’s p value=.015). Study found that 162(92.6%) respondents were aware that dead animals, blood, pork and alcohol are Haram for Muslims to use in any form (food, medication etc) showing a significant association with respect to respondent’s race ($p=.012$), and religion ($p=.022$). A large majority (94.3%) of respondents knew that ingredients of some medicines are derived from porcine and dead animals. A total of 130(74.3%) respondents had knowledge that resources are available to offer Halal alternatives of non-Halal drugs showing a significant association with respect to respondent’s gender (Fisher’s p value =.024), race ($p=.005$), and religion ($p=.001$). Study further found that a total of 155(88.6%) respondents knew that it is ethical obligation for a practitioner to take consent from the patient before dispensing any medicine which has any non-Halal content and there was a significant association between this question and respondent’s race ($p=.002$), religion ($p=.001$), and qualification (Fisher’s p value=.001). A total of 137(78.7%) respondents were aware about the presence of potentially forbidden animal-derived ingredients in medicines showing a significant association with respect to respondent’s race ($p=.023$).

Respondents’ attitude regarding Halal Pharmaceuticals

The attitude of respondents regarding Halal pharmaceuticals was evaluated by using attitude questionnaire. The frequency distribution of respondent’s attitude regarding Halal pharmaceuticals is depicted in Table-3. There were total 9 statements to evaluate the attitude of respondents. Out of maximum possible score (45), the mean attitude score was 36.65 ± 6.96 (Table -5). More than 97% scored 50% or above score, denoting a positive attitude towards Halal pharmaceuticals.

Results showed that a total of 53(30.5%) respondents strongly agreed while 58 (33.3 %) gave their opinion as ‘agree’ that they discuss with patients about forbidden/Haram ingredients of drugs. This showed a significant association with respect to respondent’s race ($p<.001$), religion ($p<.001$), and qualification ($p=.033$). A total of 70(40.2%) respondents showed their response as ‘strongly agree’ while 64(36.8%) as ‘agree’ that they feel moral obligation to disclose the derivation of non-Halal ingredients to the patient (e.g. alcohol in syrups/elixirs and gelatin in capsules). This showed a significant association with respect to respondent’s race ($p=.004$), religion ($p=.001$), and qualification ($p=.001$). A total of 91(52.3%) respondents showed their response as ‘strongly agree’ while 63 (36.2 %) as ‘agree’ that they take consent from patients, if they know the drug is non-Halal showing a significant association with respect to respondent’s race ($p<.001$), religion ($p<.001$)and qualification ($p=.003$).

Table 3: Community pharmacists’ attitude about Halal Pharmaceuticals (frequency distribution n=175)

| Statements | Responses | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------|------------|-------------|--------------|
| | SA n (%) | A n (%) | N n (%) | DA n (%) | SDA n (%) |
| I discuss with patients about forbidden/Haram ingredients of drugs. | 53(30.5) | 58(33.3) | 51(29.3) | 10(5.7) | 2(1.1) |
| I feel moral obligation to disclose the derivation of non-Halal ingredients to the patient (e.g. alcohol in syrups/elixirs and gelatin in capsules). | 70(40.2) | 64(36.8) | 34(19.5) | 5(2.9) | 1(0.6) |
| I take consent from patients, if I know the drug is non-Halal. | 91(52.3) | 63(36.2) | 16(9.2) | 3(1.7) | 1(0.6) |
| I consider patient’s religious beliefs when designing a treatment regimen. | 73(41.7) | 77(44) | 22(12.6) | 1(0.6) | 2(1.1) |
| I make an effort to search for any available Halal alternatives. | 58(33.1) | 70(40) | 38(21.7) | 8(4.6) | 1(0.6) |
| I educate the patient regarding Halal ingredients of Medicines. | 52(29.7) | 62(35.4) | 54(30.9) | 7(4.0) | |
| I prefer Halal medicines in my practice. | 81(46.3) | 36(20.6) | 46(26.3) | 9(5.1) | 3(1.7) |
| I recommend the purchase of Halal alternatives, which may be more expensive. | 68(38.9) | 37(21.1) | 56(32) | 13(7.4) | 1(0.6) |
| I feel that medical representatives are a good source of information about sources & ingredients of drugs for me. | 54(30.9) | 69(39.4) | 33(18.9) | 16(9.1) | 3(1.7) |

Note: The frequencies and percentages are based on observed values; missing values are excluded^[22]

SA= strongly agree, A= agree, N= neutral, DA= disagree, SDA= strongly disagree

In addition, the study found that a total of 73(41.7%) respondents gave their opinion as ‘strongly agree’ while 77(44 %) as ‘agree’ that they consider patient’s religious beliefs when designing a treatment regimen. This showed a significant association with respect to respondent’s race ($p<.001$), religion ($p<.001$) and qualification ($p=.015$). A total of 58(33.1%) respondents “strongly agreed” whereas 70(40 %) ‘agreed’ that they make an effort to search for any available Halal alternatives. This showed a significant association with respect to respondent’s race ($p<.001$), religion ($p<.001$), qualification ($p=.011$). A total of 52(29.7%) respondents showed their response as ‘strongly agree’ while 62(35.4 %) as ‘agree’ that they educate the patients regarding Halal ingredients of medicines showing a significant association with respect to respondent’s race ($p<.001$), religion ($p<.001$) and qualification ($p=.024$).

Study further found that a total of 81(44.3%) respondents showed their response as ‘strongly agree’ while 36(20.6%) as ‘agree’ that they prefer Halal medicines in their practice. This showed a significant association with respect to respondent’s race ($p<.001$), religion ($p<.001$) and qualification ($p=.002$). A

total of 68(38.9%) respondents showed their response as ‘strongly agree’ while 37(21.1 %) as ‘agree’ that they recommend the purchase of Halal alternatives, which may be more expensive. This showed a significant association with respect to respondent’s age (p=.005), race (p<.001), religion (p<.001), qualification (p=.041), and years of experience (p=.021). It was further found that a total of 84(48.6%) respondents indicated their opinion as ‘strongly agree’ while 66(38.2 %) as ‘agree’ that medical representatives are a good source of information about sources & ingredients of drugs for them showing a significant association with respect to respondent’s age (p=.005), religion (p=.007) and years of experience (p=.02).

Respondents’ perception regarding Halal Pharmaceuticals

The perception of respondents regarding Halal pharmaceuticals was evaluated by using perception questionnaire. The frequency distribution of respondent’s perception regarding Halal pharmaceuticals is depicted in Table-4. There were a total of 12 statements to evaluate the perceptions of respondents. All respondents had positive perceptions. Out of maximum possible score (60), the mean perception score was 51.9 ± 6.07 (Table-5) denoting a positive perception towards Halal pharmaceuticals.

Table-4: Community pharmacists’ perception about Halal pharmaceuticals (frequency distribution n=175)

| Statements | Responses | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------|------------|-------------|-------------|
| | SA n (%) | A n (%) | N n (%) | DA n (%) | SDA n(%) |
| Patient has a right to ask information about sources & ingredients of medicines. | 129(73.7) | 45(25.7) | 1(0.6) | | |
| It is important for prescriber to explain about the sources & ingredients of medicine as much as possible and encourage the patients to ask questions. | 78(44.6) | 68(38.9) | 25(14.3) | 4(2.3) | |
| Drug manufacturers should provide prescribers with a list of their products containing animal-derived ingredients. | 127(72.6) | 39(22.3) | 9(5.1) | | |
| It is not a common practice to inform the patients about sources of the medicines. | 23(13.1) | 83(47.4) | 28(16) | 24(13.7) | 17(9.7) |
| Pharmacists should be educated about the sources of medicines. | 102(58.3) | 61(34.9) | 8(4.6) | 4(2.3) | |
| Patient’s religious beliefs are considered while dispensing of medicines. | 83(48) | 72(41.6) | 15(8.7) | 1(0.6) | 2(1.2) |
| Patient’s religious beliefs impact their adherence to drug therapy. | 73(41.7) | 77(44) | 16(9.1) | 5(2.9) | 4(2.3) |
| A list of the most commonly used, animal-derived drugs and their alternatives should be developed. | 91(52) | 67(38.3) | 16(9.1) | | 1(0.6) |
| Pharmaceutical manufacturers should be sensitive towards the requirements of patients and where ever possible should produce Halal medicines. | 98(56) | 54(30.9) | 20(11.4) | 2(1.1) | 1(0.6) |
| Drug companies should clearly mark medication packaging with easy-to-spot Halal/non Halal labels. | 106(60.6) | 55(31.4) | 12(6.9) | 2(1.1) | |
| Healthcare professionals need to define medical necessity and explore existence of Halal alternatives. | 84(48.6) | 66(38.2) | 19(11) | 3(1.7) | 1(0.6) |
| Clear and well explained guidelines are need of healthcare professionals to navigate religious conflicts. | 86(49.7) | 61(35.3) | 20(11.6) | 6(3.5) | |

Note: The frequencies and percentages are based on observed values; missing values are excluded [22].

SA= strongly agree, A= agree, N= neutral, DA= disagree, SDA= strongly disagree

Results established that almost all respondents either strongly agreed (73.7%) or agreed (25.7%) that patient has a right to ask the information about sources of ingredients in medicines showing a significant association with respect to respondent's race ($p=.033$) and qualification ($p<.001$). On the other hand, a total of 78(44.6%) respondents strongly agreed and 68 (38.9%) agreed that it is important for prescriber to explain about the sources & ingredients of medicine as much as possible and encourage the patients to ask questions. This showed a significant association with respect to respondent's age ($p=.021$), race ($p=.005$), religion ($p=.004$), and qualification ($p=.016$). A total of 127(72.6%) the respondents strongly agreed while 39(22.3%) agreed that drug manufacturers should provide prescribers with a list of their products containing animal-derived ingredients. This showed a significant association with respect to respondent's race ($p<.001$), religion ($p=.001$) and qualification ($p=.021$).

Study further found that a total of 23(13.1%) respondents strongly agreed and 83(47.4%) agreed that it is not a common practice to inform the patients about sources of the medicines. On the other hand a total of 102(58.3%) respondents strongly agreed while 61(34.9 %) agreed that pharmacists should be educated about the sources of medicines. This showed a significant association with respect to respondent's race ($p<.001$), religion ($p<.001$), and years of experience ($p=.045$). A total of 83(48%) respondents strongly agreed while 72(41.6%) agreed that patient's religious beliefs are considered while dispensing of medicines showing a significant association with respect to respondent's race ($p<.001$), religion ($p=.001$), and qualification ($p<.001$).

Results showed that a total of 73(41.7%) respondents elected their response as 'strongly agree' while 77(44 %) as 'agree' that patient's religious beliefs impact their adherence to drug therapy. This showed a significant association with respect to respondent's race ($p=.002$), religion ($p<.001$) and qualification ($p=.031$). A total of 91(52%) respondents showed their response as 'strongly agree' while 67(38.3 %) as 'agree' that a list of the most commonly used, animal-derived drugs and their alternatives should be developed. This showed a significant association with respect to respondent's age ($p=.001$), race ($p=.001$) and religion ($p=.006$). However, a total of 98(56%) respondents showed their response as 'strongly agree' while 54(30.9 %) as 'agree' that pharmaceutical manufacturers should be sensitive towards the requirements of patients and, where ever possible, should produce Halal medicines. This showed a significant association with respect to respondent's age ($p<.001$) race ($p<.001$), religion ($p<.001$), qualification ($p=.017$), and years of experience ($p<.001$).

Study further found that a total of 106(60.6%) respondents showed their response as 'strongly agree' while 55(31.4 %) as 'agree' that drug companies should clearly mark medication packaging with easy-to-spot Halal/non Halal labels showing a significant association with respect to respondent's race ($p<.001$), religion ($p<.001$) and qualification ($p=.001$). A total of 84(48.6%) respondents showed their response as 'strongly agree' while 66(38.2 %) as 'agree' that healthcare professionals need to define medical necessity and explore existence of Halal alternatives showing a significant association with respect to respondent's age ($p<.001$) race ($p<.001$), religion ($p<.001$), qualification ($p=.008$), and years of experience ($p<.001$). A total of 86(49.7%) respondents showed their response as 'strongly agree' while 61 (35.3 %) as 'agree' that clear and well explained guidelines are need of healthcare professionals to navigate religious conflicts. This showed a significant association with respect to respondent's race ($p<.001$) and religion ($p<.001$).

Table 5: Mean and median score of respondents' knowledge, attitude, perception and total KAP about Halal Pharmaceuticals

| Variables | Mean± SD | Median (IQR)(25-75) |
|-------------|--------------|---------------------|
| Knowledge | 7.94 ± 1.42 | 9(7-9) |
| Attitude | 36.65 ± 6.96 | 36(32-42) |
| Perceptions | 51.9 ± 6.07 | 53(48-56) |
| KAP | 96.19 ±12.33 | 98(89-106) |

Table-6 Correlation between knowledge, attitude and perception

| Variables | Number of respondents(n) | P value | Correlation(r) |
|------------------------|--------------------------|---------|----------------|
| Knowledge- perceptions | 175 | <.001 | .463 |
| Knowledge-attitude | 175 | <.001 | .517 |
| Attitude- perceptions | 175 | <.001 | .753 |

*Correlation significant at 0.01 levels (2 tailed).

DISCUSSION

This study was conducted to evaluate the knowledge, attitude and perception of community pharmacists in Malaysia. A total of 175 pharmacists participated in the survey. Intensive literature review found that no such study has ever been conducted on the issues surrounding Halal pharmaceuticals. In the present day life, medicines have become a necessity to maintain the health of the public. Usually there are three players in this context: physicians, pharmacists and consumers^[23]. Consumers usually cannot judge which medicine is suitable for them. This is then the role of physician and/or pharmacist to choose the most suitable medication for his patient keeping in mind the religious beliefs of the patient.

An important aspect of consideration when prescribing a medication regimen is the patient him/herself. Individuals have different views on treatment, including the use of certain inactive ingredients in medications. However, most patients are unaware of these ingredients' existence in their medications. The clinicians and pharmacists should be proactive and not leave it to the patient to broach the subject. Since patients have the right to make informed decisions about their medical treatment, it is important that healthcare providers involve the patient when making treatment decisions^[24].

In this study we tried to explore the knowledge of community pharmacists about Halal pharmaceuticals. Study findings showed that pharmacists had a good knowledge towards Halal pharmaceuticals. Majority of the respondents (95%) knew that 'Muslim patients need Halal medicines'. Significant association was found between age, gender, race, religion, qualification and different statements of knowledge.

The study also found positive perception about Halal pharmaceuticals. It was very heartening to deduce that more than 90% of the respondents had perceived either 'strongly agree' or 'agree' that patients have a right to ask information about sources of ingredients in medicines which are prescribed to them. A large majority (90%) of the respondents agreed that "drug companies should clearly mark medication packaging with 'Halal' or 'non Halal' logo". This approach is also described by Khokhar et al while discussing faith issues in psychopharmacological prescribing^[25]. This is a novel and convenient approach that if drug manufacturers get into the practice of clearly marking a medicine as Halal or non-Halal, then public would have a choice and would be in a better position to select a medicine conforming to their religious faith. A large majority of respondents perceived that patient's religious beliefs impact their adherence to drug therapy. This is in line with Sattar et al^[26] who reported four different cases of patient's non-adherence due to religious beliefs. Majority of respondents either strongly agreed or agreed that pharmaceutical manufacturers should be sensitive towards the requirements of Muslim patients and where ever possible should produce Halal medicines. This is in accordance with what is reported by Bashir et al^[27] while discussing 'Concordance in Muslim patients in primary care'. A large majority of respondents perceived that drug manufacturers should provide prescribers with a list of their products containing animal-derived ingredients to assist the prescriber. This approach is in line with what is reported by Hoesli & Smith while discussing effects of religious and personal beliefs on medication regimen design^[24]. Majority of respondents perceived that pharmacist should be educated more about Halalness of pharmaceuticals. Moreover, they felt that doctors should also inform their patients about Haram ingredients. Majority of the respondents are in favor to seek guidance from religious leaders regarding the use of medicines. Significant association was found between age, gender, race, religion, qualification, years of experience and different statements of perception.

Study respondents have positive attitude towards Halal pharmaceuticals. Almost all respondents scored 50% and above. Significant association was found between age, race, religion, qualification, years of experience and different statements of attitude. A significant, positive and moderate (0.3-0.7) correlation was found between knowledge and attitude & between knowledge and perception ($r=.458$, $p<.001$) while strong (>0.7) correlation was found between attitude and perception ($r=.753$, $p<.001$). This means that better knowledge the respondents have on Halal pharmaceuticals, better their perception is towards Halal pharmaceuticals.

CONCLUSION

To summarize this discussion, it can be said that this study is an indicator that, the knowledge, attitude and perception regarding Halal status of pharmaceuticals were good. A large percentage ($< 96\%$) of the respondents scored 50% and above in each domain. Significant correlations were found between knowledge & attitude, attitude & perception and knowledge & perception.

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

Saleha Sadeeqa, carried out the Halal pharmaceutical studies, drafted the manuscript and performed the statistical analysis.

Azmi Sarriiff, conceived of the study, participated in the sequence alignment and its design and coordination

Imran Masood, participated in the design of the study and helped to draft the manuscript

All authors read and approved the final manuscript.

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