



General Public Knowledge on the Halalness of Herbal Syrup in Yogyakarta Province, Indonesia

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ABSTRACT

Background: Recently there is an increase concern regarding the halal certification of herbal medication. This is due to the potential use of alcohol in the extraction process as well as in the formulation of herbal syrup. Measurement of public knowledge regarding the halal aspect of herbal syrup containing alcohol has never been reported in Indonesia.

Objective: The purposes of the study is to determine the level of public knowledge regarding halal aspect of herbal syrups in Indonesia, especially in Yogyakarta Province. Alcohol has been widely used in herbal products as a solvent for extraction. Trace of alcohol has been shown to be present in herbal syrup.

Methods: 300 respondents from Yogyakarta Province, Indonesia from a variety of sociodemographic backgrounds were recruited. The study employed a modified paper-based questionnaire to collect the respondents' sociodemographic details and their level of awareness regarding the halalness of herbal syrups. The study employed descriptive statistics to examine sociodemographic variables and knowledge and used Chi-Square analysis to examine the correlation between demographic characteristics and knowledge.

Results: The study suggests that the public has good knowledge regarding the halalness of herbal syrups (59.0%). However, around 41% of respondents still have low knowledge regarding the topic. There were a relationship between the age of the respondent and the level of knowledge ($p<0.05$). Respondents who are less than 45 years old tend to have a good knowledge of the halalness of herbal syrup while in the elderly population, more than 50% of the respondents showed a lack of knowledge on the topic studied.

Conclusions: There are varying levels of understanding regarding the halalness of herbal syrups in the community. While the majority of responders have a good knowledge, a significant portion still do not fully grasp this concept. To increase public knowledge of the halal components in drugs, especially among the elderly, further strategies are needed.

Keywords: general public; halal; herbal medicine syrup; level of knowledge

INTRODUCTION

Indonesia is a country that has the largest Muslim population in the world. Roughly 87% of Indonesia's population is Muslim.¹ With 229 million Muslim population, Indonesia is the country with the biggest Muslim population globally. This demographic composition significantly affects every product that is sold in Indonesia, particularly when it comes to the halal aspect of the products. Islamic teachings believe that halal is mandatory.

Therefore, every Muslim who wants to use or consume a product including medication is required to ensure that it is halal.^{2,3}

The halal requirement for medicinal products has been reported in an authentic hadith "From Abu Darda" he said: Rasulullah SAW said: "Indeed, Allah has sent down disease and medicine for every disease, so seek treatment and do not seek treatment with what is haram" (HR. Abu Dawud). This hadith highlights the need for Muslims to consider halalness when using medication. Indonesia with Muslims as most of the population has two laws in force among others: Law no 33 year of 2014 and Government Regulation no 39 year of 2021 about Halal Product Guarantees (JPH).⁴ The regulation stipulates that some commodities including medication must be halal certified to be entered, circulated, or traded on Indonesian territory. Both the government and producers have implemented many strategies to meet the regulation that all traditional medicine should be halal-certified in October 2024. According to statistics from LPPOM MUI, as of March 24, 2022, although there were 19,483 pharmaceutical items registered with BPOM, only 2,586 of them are halal-certified pharmaceutical products including drugs and vaccines.⁵

Herbal medicine is one of the products that is subjected to halal certification mandatory by October 2024 in Indonesia. The herbal medicine's halal status is determined by three key factors: 1) the extraction method and ingredient isolation; 2) the fermentation process and ingredient isolation; and 3) the use of auxiliary components (excipients). In addition, key elements that can guarantee contamination avoidance and qualify herbal medications as halal products are production procedures, packaging, storage, and distribution.^{6,7} One of the critical parameters for both herbal and non-herbal syrup is the presence of alcohol as a co-solvent to improve the solubility of the bioactive.⁸⁻¹⁰ According to the Majelis Ulama Indonesia (MUI), the alcohol content in the finished beverage product is halal if it is not medically harmful and is accepted at less than 0.5 percent v/v. In addition to halal issues, alcohol also interferes with brain health and blood-brain barrier function at certain levels of consumption.¹¹⁻¹³

Since herbal medicine, alcohol, and halal have a significant role in society, it is necessary to measure public awareness about the halal status of herbal syrup. Little information is currently available on Indonesian consumers' awareness of halal herbal medicinal syrup goods. The data available in Indonesia focuses on the knowledge of community pharmacists about halal certifications.¹⁴ Research on the public's awareness of halal medical products has been conducted in other nations such as Malaysia and Palestine. The studies include the general public, university students in the faculty of sports, and university students in the faculty of pharmacy.¹⁵⁻¹⁷ In addition, a study on halal medications among Sharia practitioners was carried out in Palestine.¹⁸

The current study aims to evaluate the level of knowledge regarding the halal status of herbal syrups. Questionnaires were used to measure the level of knowledge and the relationship between demographic characteristics and the level of knowledge. The studies will contribute to the increased data availability on halal perspectives on medication among the general public in Indonesia.

METHODS

Study design

This study uses a cross-sectional observational model approach (non-experimental) which uses a validated and structured questionnaire with a quantitative descriptive design that is adapted and modified from previous research.

Population and samples

The population in this study is the community domiciled in the Province of Yogyakarta. The Slovin formula, which is used to calculate the minimal number of research samples for cross-sectional study designs, provides the basis for the number of samples that are employed. The following is the formula used in the Slovin approach to determine the responder sample:

$$n = \frac{N}{1 + Ne^2}$$

n = number of samples, N = number of populations, e = percentage of error allowance, where: e = 0.1 (10%) for large population and e = 0.2 (20%) for small population.

Based on the results of the Inter-Census Population Survey population projection from Badan Pusat Statistik (BPS), the population of Yogyakarta City is 311,766 with total population data (414,487) minus the number of residents aged 0-17 years (102,721). Therefore, 100 samples are the bare minimum needed for this investigation.¹⁹ In the survey conducted from November 2023 to December 2023, data was collected from 300

respondents. A total of fifteen questions divided into two categories (knowledge and sociodemographic) were revised and adjusted from previous studies.^{15–17,20} Sampling was carried out by simple random sampling with the inclusion criteria of the study, namely residents domiciled in the city of Yogyakarta and at least eighteen years old. Those who chose not to complete the questionnaire or withdrew during the filling process were exclusion criteria for this study.

Study instruments

This study used a validated questionnaire from previous studies which was used as a model questionnaire, then translated into Indonesian and modified as needed. In this study, a supervisor from the Faculty of Pharmacy UGM who had expertise in social research helped to conduct validation testing using expert views, or judgment experts. In order to assess the study variables, the instrument is separated into two sections. The first component includes sociodemographic information about the respondents, such as gender, age, place of residence, employment, degree of education, and religion. Eight questions in the second section gauge respondents' understanding of herbal medicinal syrup's halal status. Based on the response options accessible to respondents, each parameter is evaluated on a two-point scale: "Yes" receives one point, while "No" and "Don't Know" receive zero points. Every statement's veracity or untruth is assessed and divided into positive and negative groups.

Then, 30 Yogyakarta City citizens participated in a pilot study. The validity of the questionnaire was evaluated using the Pearson correlation technique by comparing the computed R value with the R table. The question item is deemed legitimate if the computed R value is greater than the R table value; otherwise, it is deemed invalid. Additionally, it is also emphasized that items are deemed legitimate if their significance is less than 0.05 and invalid if it is greater than 0.05. With a reliability score of 0.673. The reliability of the questionnaire was assessed using Cronbach's Alpha. These results indicate that the instruments used have good reliability and can be used to support research.

Data collection

The data for this study was gathered using a combination of offline and online methods. While the offline approach involved handing surveys to respondents in person at various Yogyakarta City community events, the online strategy involved distributing questionnaires via a digital platform. Official consent has been received for all study activities from the village, RT/RW, and local sub-district.

Data Analysis

Following data cleaning, the Kolmogorov-Smirnov test was used to determine if the data was normal. The data were not normally distributed, as indicated by the Kolmogorov-Smirnov test results, where the knowledge significance value was 0.000 and the significant value was less than 0.05. Consequently, the median value served as the basis for classifying the degree of knowledge. Because in the data were not normally distributed, the median represents the midpoint value of a distribution. The community's knowledge level is also classified using the results of this exam. The data are compiled using descriptive statistics, which also give a general picture of the distribution of respondents' responses and sociodemographic factors. The association between the knowledge scores and the demographic factors was then examined using Chi-Square analysis. P values of less than 0.05 were regarded as statistically significant.

RESULTS AND DISCUSSION

This study evaluates Yogyakarta City, Indonesia residents' awareness of the halalness of herbal syrups. Among 300 respondents, the studies found that: 1) The general public in Yogyakarta exhibited a good level of knowledge in terms of the halalness of herbal syrup. 2) The public did not have sufficient knowledge in terms of what percentage of alcohol is considered halal. 3) There are correlations between the knowledge and age of the respondents. 4) The young generation tends to have a better knowledge regarding the topic compared to the elderly. Detailed data are described in the section below.

Sociodemographic Characteristics

The characteristics of the respondents identified in the questionnaire include gender, age, employment, greatest degree of education, and religion. A summary of the demographic data is provided (Table I). Respondent characteristics based on descriptive results analysis indicate that respondents are more likely to be female (73.3%) than male (26.7%). Responses were divided into groups according to age: 18–25 years old (38.0%), 26–

35 years old (5.7%), 36–45 years old (6.7%), 46–55 years old (13.7%), 56–65 years old (18.7 percent), and older than 65 years old (17.3 percent). The participants in this study include Yogyakarta City residents who are employed as students (34.7%), housewives (30.3%), self-employed (12.3%), private workers (9.3%), state civil servants (2.3%), retirees (8.7%), and others (2.3%). Subsequently, it was discovered that the majority of respondents had completed high school/vocational school (51.3%), undergraduate education (26.3%), and the majority of respondents (88.7%) identified as Muslims.

Table I. Sociodemographic of Respondent

Characteristics	Sociodemographic characteristics	Frequency (n (%))
Gender	Male	80 (26.7%)
	Female	220 (73.3%)
Age	18 – 25	114 (38.0%)
	26 – 35	17 (5.7%)
Age	36 – 45	20 (6.7%)
	46 – 55	41 (13.7%)
Age	56 – 65	56 (18.7%)
	> 65	52 (17.3%)
Occupation	Student	104 (34.7%)
	Self-employed	37 (12.3%)
Occupation	Private sector employee	28 (9.3%)
	State Civil Apparatus	7 (2.3%)
Occupation	Retired	26 (8.7%)
	Housewife	91 (30.3%)
Occupation	Other	7 (2.3%)
	No formal education	8 (2.7%)
Education	Elementary school	16 (5.3%)
	Junior high school	31 (10.3%)
Education	Senior high school	154 (51.3%)
	Bachelor degree	79 (26.3%)
Education	Master	9 (3.0%)
	Doctor	3 (1.0%)
Religion	Muslim	266 (88.7%)
	Christian	16 (5.3%)
Religion	Catholic	17 (5.7%)
	Buddhist	1 (0.3%)
Religion	Hindu	0 (0.0%)
	Other	0 (0.0%)

Description of the Level of Knowledge of the People of Yogyakarta City

Table II displays the median knowledge score, which is 5. This suggests that the knowledge level is categorized using this value. The knowledge data test results, which are not normally distributed, are the reason for the median-based classification of knowledge levels using Kolmogorov-Smirnov analysis. According to Table II of the overall research results, the majority of Yogyakarta City residents are well-informed on whether herbal syrup is halal. On the other hand, it was found that of respondents knew very little about the subject (41.0%). The majority of responders (59.0%) have a high degree of expertise. Several regions in Indonesia provided data results that were consistent with this study, although information on the level of public awareness regarding the halal status of herbal syrups in Indonesia is still lacking and no detailed^{21,22}. This highlights need for more comprehensive research to understand the level of public awareness.

Table II. Scores of knowledges

	Total Respondent Scores	Frequency (n(%))
Good Knowledge	X ≥ 5.0	177 (59.0%)
Lack of Knowledge	X < 5.0	123 (41.0%)

The frequency distribution of respondents' knowledge regarding herbal medicine syrup is explained in Table III. According to the study, 267 (89.0%) respondents were aware that syrups made from herbal medicines were within the category that required halal certifications. The majority of the respondents (83.3%) did not know that halal assurance of herbal syrup is not solely the responsibility of the Majelis Ulama Indonesia (MUI) but also the responsibility of producers and other stakeholders. The majority of the respondents (60.0%) were aware that it is the official halal certification that can guarantee the halalness of the product, but not the logo. Indeed 75.3% are aware that the halal logo can be added illegally without having an official halal certification (question no 5). As expected, all of the respondents (94.0%) were aware that the purpose of halal certification and labeling is to ensure that a product is safe to eat under Islamic law.

Table III. Respondent knowledge about halalness of herbal medicine syrup (frequency distribution)

No.	Statement	Responses (n%)		
		Correct	Incorrect	Not Know
1	Herbal syrup is example of the product that required halal certification	267 (89.0%)	5 (1.7%)	28 (9.3%)
2	Majelis Ulama Indonesia (MUI) is responsible for all halal assurance of the herbal syrup products	13 (4.3%)	250 (83.3%)	37 (12.3%)
3	Halal Certification, not necessarily a halal logo, can guarantee the halalness of herbal syrup.	180 (60.0%)	61 (20.3%)	59 (19.7%)
4	Halal certification and halal logo are aimed to guarantee the safety of a product for consumption according to Islamic law	282 (94.0%)	5 (1.7%)	13 (4.3%)
5	The halal logo can be added to the packaging without having an official halal certificate	226 (75.3%)	31 (10.3%)	43 (14.3%)
6	Herbal syrup on the market does not require a halal certification	209 (69.7%)	47 (15.7%)	44 (14.7%)
7	According to the MUI, liquid medicinal preparations with alcohol content below 0.5% can be said to be halal	99 (33.0%)	63 (21.0%)	138 (46.0%)
8	The presence of alcohol content in herbal syrup products can be considered halal if they still comply with MUI regulation	183 (61.0%)	36 (12.0%)	81 (27.0%)

Regarding the herbal syrup, 69.7% of the respondents were aware that herbal syrup items on the market do need a halal certification. The survey discovered that the understanding of the public regarding what percentage of alcohol can be considered permissible in Islamic law is quite low. Most of the respondents (46.0%) did not know what percentage of alcohol is permissible in herbal syrup. Only 33% of the respondents know that the maximum alcohol content is 0.5% v/v. While 21% of the respondents answer incorrectly. Indeed, 61.0% were aware that herbal syrup products with alcohol content may be considered halal if they still adhered to MUI requirements. This suggests that although the public has a good knowledge of the halal aspect of herbal syrup, they do not have sufficient knowledge in terms of what level of alcohol is considered halal in herbal syrup.

This study found that a significant number of respondents are aware that herbal medicinal syrups are subjected to halal certification. Statement number 2 (Table III) regarding the role of the Majelis Ulama Indonesia (MUI) in assessing the halal status of herbal syrup illustrates the general public did not know which stakeholders is responsible for halal certification of the products. Furthermore, 138 (46.6%) of the respondents in Yogyakarta City do not know the upper limit of alcohol levels in liquid preparations that are acceptable for halal consumption. However, the majority of respondents were aware that herbal syrup featured halal components, as well as halal certification and labeling, which served to ensure that the product was safe to consume following Islamic law. Thus, greater public outreach and education campaigns are required to disseminate more precise and thorough information, particularly concerning the halal elements of herbal goods, engaging organizations like the MUI.

Relationship of Sociodemographic Factors to Knowledge Level

The correlation between the sociodemographic characteristics of respondents and the knowledge stated in Table IV shows that age plays an important role in determining respondents' knowledge. This result is stated from the results of the chi-square test on five independent variables which show a p-value < 0.05 on the age variable, namely 0.001. Meanwhile, the results of the chi-square test for other variables such as gender,

education, occupation, and religion produce a p-value > 0.05. Thus, these variables are not related to the high or low level of knowledge of the people of Yogyakarta City regarding the halalness of herbal syrup.

Table IV. Correlation between knowledge and sociodemographic characteristics of respondents

Variable	Knowledge Level		p-value
	High (n%)	Low (n%)	
Gender			
Male	51 (63.7%)	29 (36.3%)	0.313
Female	126 (57.3%)	94 (42.7%)	
Age			
Adults (\leq 45 years)	103 (68.2%)	48 (31.8%)	0.001
Elderly ($>$ 45 years)	74 (49.7%)	75 (50.3%)	
Education			
College education	56 (61.5%)	35 (38.5%)	0.555
Non-college education	121 (57.9%)	88 (42.1%)	
Occupation			
Employed	42 (53.2%)	37 (46.8%)	0.219
Unemployed	135 (61.1%)	86 (38.9%)	
Religion			
Muslim	162 (60.9%)	104 (39.1%)	0.061
Non-Muslim	15 (44.1%)	19 (55.9%)	

This study uses Yogyakarta residents as a sample to investigate the awareness of halal herbal medication syrup among Indonesians. Previously, other reports had examined Indonesian pharmacists' attitudes and knowledge regarding halal certification and their preparedness to manufacture halal medications.¹⁴ By concentrating on a sample of respondents who are residents of Yogyakarta City, this study for the first time provides information on the knowledge of the general public in Indonesia regarding the halal aspect of herbal syrup. This data will increase our understanding of the general public's perception of halal herbal syrups in Indonesia, particularly in Yogyakarta.

Age is one of the sociodemographic characteristics that affects the prevalence of knowledge gaps in Yogyakarta City's population. The studies also revealed that gender, education, employment and religion have no significant contribution to the public knowledge of herbal syrup halalness. This is in contrast to a study conducted by Xuan on knowledge, attitudes, and perceptions of halal drugs among pharmacy students from a private Malaysian university in 2022. The study stated that gender, age, and religion had a significant influence on the level of knowledge. These differences may be caused by variations in research subjects, sample populations, measured variables, and time or place contexts.

The novelty of the study outlined above lies in its focused examination of the Indonesian populace's awareness of the halal status of herbal medicinal syrups, particularly within Yogyakarta Province. This study ventures into relatively unexplored territory by specifically targeting the understanding and perception of halal certification among consumers of herbal medicinal syrups in Indonesia, a country with the world's largest Muslim population and a significant consumer base for halal products.²³ Previous research has predominantly concentrated on the knowledge of pharmacists and healthcare professionals regarding halal certifications in the pharmaceutical sector, or it has explored the public's awareness of halal medical products in other countries, such as Malaysia and Palestine.^{17,20} However, this study uniquely addresses the gap in the existing literature by focusing on consumer awareness of the halal status of herbal medicinal products, which is an area that has not been extensively studied within the Indonesian context. Moreover, the study is significant as it delves into a critical aspect of healthcare and consumer goods in a predominantly Muslim country, where the demand for halal-certified products is a religious obligation and a reflection of cultural and ethical considerations. By concentrating on herbal medicinal syrups and the factors that contribute to their halal certification, such as the use of alcohol in extraction processes and the overall production chain, the research provides insights into a specific and crucial area of halal product certification that affects consumer choices and trust. Additionally, the study contributes to the broader discourse on halal certification and its impact on pharmaceuticals by highlighting the challenges and considerations involved in ensuring products meet halal standards, thereby

informing policy, regulation, and consumer education in Indonesia and potentially in other regions with significant Muslim populations. This study has several limitations, namely the time available is relatively lacking even though the number of samples needed is quite large. In addition, the subjectivity of respondents' answers and the influence of external factors such as the social and cultural environment can affect the validity of the research results.

CONCLUSION

The majority of respondents to this study attained a decent level of knowledge, indicating that the general public's awareness of halal herbal medicine syrups in Indonesia, particularly in the Special Region of Yogyakarta Province, is relatively adequate. The studies identified that there is a significant contribution of the age of the respondents toward the level of knowledge regarding this particular topic. On the other hand, sociodemographic factors such as gender, level of education, occupation, and religion did not affect the level of knowledge. The public is generally aware that herbal syrup is subjected to halal certification but lacks of awareness regarding what level of alcohol in the herbal syrup is permissible in the halal certification.

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STATEMENT OF ETHICS

The study has been approved by the Gadjah Mada University Ethics Commission with an ethical clearance letter with the number KE/UGM/066/EC/2023.

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