

## Original Research

# Assessments of herbal medicine counseling practices, barriers, and information resource needs in community pharmacy settings

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### Abstract

**Introduction:** The use of herbal medicines in Indonesia continues to rise; however, community pharmacists infrequently engage in patient counseling or documentation related to herbal medicine use. **Objective:** This study aimed to assess pharmacists' practices regarding the discussion and documentation of herbal medicine use in community pharmacies, identify barriers to counseling, and evaluate information resource needs to support herbal medicine-related public health services. **Methods:** A cross-sectional survey was conducted using a validated structured questionnaire among pharmacists working in community pharmacies, recruited through convenience sampling. Data were analyzed using descriptive statistics, Chi-square tests, and Spearman's correlation, with statistical significance set at  $p < 0.05$ . **Results:** A total of 451 pharmacists participated. Most reported occasionally discussing herbal medicine use with patients (51.0%), while (3.1%) never did so. Documentation followed a similar pattern, with (33.5%) recording occasionally and (14.6%) never documenting. Discussions were more often patient-initiated (37.7%) than pharmacist-initiated (29.3%) and were commonly brief (25.9%). Although (94.0%) of pharmacists expressed interest in discussing herbal medicines, practice remained limited. The most frequently reported barriers were time constraints (42%), insufficient knowledge (21%), lack of reliable information sources (20%), and limited scientific evidence (13%). Most pharmacists had access to herbal information at their workplace (87.6%) and herbal products were widely available (88.9%). However, evidence-based databases were rarely used, with websites and brochures being the most common information sources. Access to information and prior training were significantly associated with more frequent counseling and documentation, while herbal product sales and weekly working hours showed no significant associations. A moderate positive correlation was observed between discussing and documenting herbal medicine use ( $p = 0.563$ ). **Conclusion:** Enhancing pharmacists' counseling and documentation practices related to herbal medicines will require expanded continuing education opportunities, improved access to credible, evidence-based information resources, and the development of national guidelines and digital decision-support tools. Such measures are essential to support consistent, safe, and evidence-informed pharmaceutical services in community pharmacies across Indonesia.

**Keywords:** Herbal medicines; pharmacist practice; evidence-based information; community pharmacy.

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## INTRODUCTION

The prevalence of traditional medicine use varies considerably across countries and regions. In several high-income Western countries, traditional and complementary medicine remains widely used; for example, approximately 35% of the population in the United States report using at least one herbal medicine, and 50.3% of Australians report

using complementary medicine products. In Southeast Asian countries, traditional medicine use is also reported among the population, with prevalence estimates of 8.8% in Malaysia and 18.8% in the Philippines<sup>1-3</sup>. In Indonesia, traditional medicine continues to play an important role in healthcare practices. According to the 2018 Basic Health Research (Riskesdas) survey, nearly half of the Indonesian population (48%) reported using traditional medicine<sup>4</sup>. Furthermore, data from the Indonesian National Agency of Drug and Food Control (BPOM) indicate that 20,842 traditional medicinal products are currently registered and circulating in the country<sup>5</sup>.

Traditional medicines are often perceived as safer alternatives to synthetic drugs<sup>6</sup>. However, inappropriate or unregulated use may lead to serious adverse effects, including nephrotoxicity, nephrolithiasis, hepatorenal syndrome, nephrotic syndrome, and hypertension<sup>7</sup>. In Africa, the use of herbal medicines has been implicated in approximately 30-35% of acute renal failure cases<sup>8</sup>. Similarly, in Italy, adverse events such as rhabdomyolysis have been reported following traditional medicine use<sup>9</sup>. In several Asian countries including Singapore, Japan, Korea, China, and India, traditional medicines have been identified as a cause of drug-induced liver injury (DILI)<sup>10</sup>. In addition, concomitant use of traditional and conventional medicines may result in clinically significant drug-herb interactions<sup>11</sup>. For instance, Ginkgo biloba



combined with synthetic drugs such as paracetamol, aspirin, warfarin, or ibuprofen has been associated with adverse outcomes such as bleeding, apraxia, and even fatal events<sup>12</sup>. Similarly, turmeric (*Curcuma longa*) taken alongside, amiloride, anticoagulants, antiplatelet agents, anti-inflammatory drugs, warfarin, or celecoxib may increase the risk of bleeding, transient hypotension, bradycardia, and vasodilation<sup>13</sup>. The concomitant use of garlic with ritonavir or chlorpropamide has also been reported to cause gastrointestinal toxicity and hypoglycemia<sup>11</sup>. Pharmacists play a crucial role in identifying and managing herbal use in patients to minimize the risk of herbal-related harm, yet a relatively small proportion of pharmacists (34%) reported confidence in their ability to effectively counsel patients on herbal medicines, and half (50%) reported that they do not routinely assess patients' herbal medicine use<sup>14</sup>.

Pharmacies are primary healthcare facilities that serve a crucial role within public health systems<sup>15</sup>. Due to their accessibility, pharmacies provide a wide range of health services, including the dispensing of prescription and over-the-counter medicines, as well as the provision of supplements, vitamins, and herbal products<sup>16</sup>. A study conducted in Missouri, United States, reported that more than 50% of community pharmacists frequently received questions regarding herbal medicine use, yet only 2% felt consistently able to provide appropriate answers<sup>17</sup>. Similarly, research in Riyadh, Saudi Arabia, found that although 76% of community pharmacists sold herbal medicines, only 16.4% regularly engaged in discussions with patients regarding their use<sup>18</sup>.

Pharmacists must possess sufficient knowledge of herbal medicines to guide the public in selecting safe products and ensuring their appropriate use<sup>14</sup>. To support this role, community pharmacists also require access to reliable, evidence-based information sources that enhance their capacity to provide drug information services<sup>18</sup>. As healthcare professionals, they carry the responsibility of assisting patients in making informed choices about herbal medicines and offering guidance on their safe and effective use<sup>15</sup>.

Despite the widespread use of herbal medicines in Indonesia, no studies have comprehensively examined the attitudes and practices of community pharmacists in providing counseling to patients seeking herbal products. This study aims to explore community pharmacists' behaviors and counseling practices related to herbal medicine use, identify perceived barriers that may hinder effective pharmacist-patient communication, and assess the availability and utilization of information resources that support the delivery of herbal medicine services in community pharmacies.

## MATERIALS AND METHODS

### Study Design and Ethics

A cross-sectional online survey was conducted between September and December 2024 to assess herbal medicine

counseling practices, perceived barriers, and information resource needs among community pharmacists in Indonesia. The study followed the STROBE guidelines for reporting observational research. Ethical approval was obtained from the Pharmaceutical and Health Research Ethics Committee, Faculty of Pharmacy, Hasanuddin University (Approval No. UH1012409080). All participants provided informed consent electronically prior to enrollment.

### Participants

The study targeted licensed community pharmacists practicing across Indonesia. Pharmacists were eligible if they had been employed in the same community pharmacy for a minimum of three months, agreed voluntarily to participate, and completed all mandatory survey items. Only fully completed questionnaires were included in the final analysis, and no incentives were offered. This recruitment approach constituted a non-probability convenience sampling.

### Data Collection Procedures

Data were collected using a structured, self-administered questionnaire created in Google Forms. The survey link was distributed through social media and professional communication channels frequently used by pharmacists in Indonesia, including WhatsApp and Instagram. To minimize the possibility of duplicate submissions, respondents were required to use a unique email account, and only one response per account was permitted. No personally identifiable information was collected, and all responses were stored anonymously in a password-protected database accessible only to the research team. Confidentiality was maintained throughout the study, and all data were handled in accordance with institutional ethical standards. Because the survey was disseminated through open online networks, the total number of pharmacists who received the survey invitation could not be determined.

### Survey Instrument

The survey instrument was adapted from a questionnaire originally developed by Al-Arifi et al. (2013), which was designed to assess the availability of and need for herbal medicine information resources in community pharmacies<sup>18</sup>. The adapted questionnaire comprised four main sections. The first section collected respondents' sociodemographic and professional characteristics, including gender, age, educational background, years of work experience, type of pharmacy, pharmacists' weekly working hours, number of pharmacists and pharmaceutical technicians, the presence of practicing physicians in the pharmacy, and prior training related to herbal medicines (15 items). The second section addressed pharmacists' practices related to herbal medicine use, including their experiences in accessing information, the availability and sale of herbal products in their pharmacies, the frequency of patient-pharmacist discussions about herbal medicines,



and the extent to which pharmacists documented patients' herbal medicine use (6 items). The third section explored perceived barriers that might limit pharmacists' engagement in discussions about herbal medicines with patients (1 item). The final section assessed the availability of herbal medicine information sources and pharmacists' perceived needs for additional resources, including the types of information media they considered most useful for supporting pharmacy services (2 items).

### Translation Process

The questionnaire underwent a structured translation process to ensure linguistic accuracy and conceptual equivalence. It was first translated from English into Indonesian through forward translation by two independent translators. Subsequently, two professional translators (both native English speakers with proficiency in Indonesian) performed the back-translation into English to verify consistency in meaning<sup>19</sup>. Discrepancies between the original and back-translated versions were reviewed and reconciled. To strengthen content validity, experts in community pharmacy and phytopharmaceuticals evaluated the translated instrument for clarity, relevance, and comprehensibility, and their feedback was incorporated into the final version.

### Pre-Testing

Following translation and expert review, the questionnaire was pilot-tested among 30 community pharmacists selected. Qualitative pre-testing is an essential step in developing, adapting, or translating questionnaires and psychometric tools. Its primary goal is to ensure that the target population correctly understands each item and can provide meaningful responses. Responses collected during the pilot test were used solely for instrument improvement and were excluded from the main study analysis<sup>20</sup>.

### Reliability Test

The reliability of the final instrument was assessed using Cronbach's alpha to measure internal consistency across items within each domain. A Cronbach's alpha coefficient between 0.60 and 0.70 was considered acceptable for exploratory research, indicating that the instrument demonstrated adequate reliability for use in assessing pharmacists' herbal medicine counseling practices and information needs<sup>21</sup>.

### Data Analysis

All data were entered and analyzed using IBM SPSS Statistics version 29. Descriptive statistics were used to summarize respondent characteristics and variables related to herbal medicine information access, training, counseling behaviors, documentation practices, and pharmacy characteristics.

Categorical variables were reported as frequencies and percentages.

Associations between access to herbal medicine information, herbal medicine sales practices, continuing education, weekly working hours, and pharmacists' counseling or documentation behaviors were assessed using the Chi-square test of independence. Fisher's exact test was applied when the assumptions for Chi-square were not met (>20% of expected cell counts <5). Statistical significance was set at  $p < 0.05$ .

To evaluate the relationship between the frequency of discussing herbal medicine use with patients and the frequency of documenting such use, Spearman's rank-order correlation was used, given the ordinal nature of both variables. Agreement between discussion and documentation practices was further examined using Cohen's kappa coefficient, interpreted according to established thresholds ( $\leq 0.20$  = slight,  $0.21-0.40$  = fair,  $0.41-0.60$  = moderate agreement),  $0.61-0.80$  = substantial, and  $0.81-1.00$  = almost perfect.

## RESULTS

### Questionnaire validation

The questionnaire was translated from English into Indonesian using a two-step forward translation process, followed by back translation to ensure semantic accuracy and consistency with the original instrument. The translated questionnaire was then pretested with 30 community pharmacists to evaluate clarity, wording, and the appropriateness of the listed information sources. Based on their feedback, several items were revised to improve readability and clarity, and the response options related to information sources (e.g., books, brochures, websites, computer databases, and pharmacist consultations) were refined.

Internal consistency reliability was assessed for the section measuring pharmacists' practices related to herbal medicine use (6 items). The reliability analysis yielded a Cronbach's alpha value of 0.62, which is considered acceptable for exploratory research, indicating that the questionnaire was suitable for use in this study.

### Participants

A total of 467 responses were received during the data collection period. After assessing data completeness, 16 responses were excluded due to incomplete questionnaires. Consequently, 451 responses were considered complete and included in the final analysis. Because the survey link was distributed through open online channels, the total number of pharmacists who received or viewed the invitation could not be determined; therefore, a response rate could not be calculated.

| <b>Table 1. Respondents' characteristics (n=451)</b> |                      |
|------------------------------------------------------|----------------------|
| <b>Characteristic</b>                                | <b>Frequency (%)</b> |
| <b>Sex</b>                                           |                      |
| Female                                               | 312 (69.2)           |
| Male                                                 | 139 (30.8)           |
| <b>Age (years)</b>                                   |                      |
| 20-30                                                | 328 (72.7)           |
| >30-40                                               | 82 (18.2)            |
| > 40                                                 | 41 (9.1)             |
| <b>Marital status</b>                                |                      |
| Married                                              | 151 (33.5)           |
| Not married/widow/widower                            | 300 (66.5)           |
| <b>Highest level of education</b>                    |                      |
| Pharmacist degree                                    | 406 (90.0)           |
| Master degree                                        | 41 (9.1)             |
| Doctorate                                            | 4 (0.9)              |
| <b>Pharmacy location</b>                             |                      |
| Western Indonesia                                    | 169 (37.5)           |
| Central Indonesia                                    | 248 (55.0)           |
| Eastern Indonesia                                    | 34 (7.5)             |
| <b>Duration of employment at current pharmacy</b>    |                      |
| 1-5 years                                            | 389 (86.3)           |
| >5 years                                             | 62 (13.7)            |
| <b>Number of pharmacies where respondent works</b>   |                      |
| 1 Pharmacy                                           | 370 (82.0)           |
| 2 Pharmacies                                         | 81 (18.0)            |
| <b>Number of pharmacists at the workplaces</b>       |                      |
| 1 Pharmacist                                         | 244 (54.1)           |
| 2 Pharmacists                                        | 154 (34.1)           |
| 3 or more Pharmacists                                | 53 (11.8)            |
| <b>Average weekly working hours</b>                  |                      |
| 20 hours or less                                     | 84 (18.6)            |
| 21–40 hours                                          | 165 (36.6)           |
| 41–60 hours                                          | 28 (6.2)             |
| More than 60 hours                                   | 174 (38.6)           |
| <b>Type of pharmacy</b>                              |                      |
| Independent                                          | 348 (77.2)           |
| Network                                              | 103 (22.8)           |
| <b>Number of pharmaceutical technicians</b>          |                      |
| 1 technician                                         | 127 (28.2)           |
| 2 technicians                                        | 165 (36.6)           |
| 3 or more technicians                                | 159 (35.3)           |
| <b>Presence of a medical doctor at the pharmacy</b>  |                      |
| Yes                                                  | 227 (50.3)           |

|                                                                     |            |
|---------------------------------------------------------------------|------------|
| No                                                                  | 224 (49.7) |
| <b>Training on rational use of herbal medicines</b>                 |            |
| Yes                                                                 | 203 (45.0) |
| No                                                                  | 248 (55.0) |
| <b>Training on assisting patients in selecting herbal medicines</b> |            |
| Yes                                                                 | 178 (39.5) |
| No                                                                  | 273 (60.5) |
| <b>Access to herbal medicine information at workplace</b>           |            |
| Yes                                                                 | 395 (87.6) |
| No                                                                  | 56 (12.4)  |
| <b>Herbal medicine products sold in the pharmacy</b>                |            |
| Yes                                                                 | 401 (88.9) |
| No                                                                  | 50 (11.1)  |
| <b>Frequency of discussing herbal medicines with patients</b>       |            |
| Very often                                                          | 29 (6.4)   |
| Often                                                               | 100 (22.2) |
| Sometimes                                                           | 230 (51.0) |
| Rarely                                                              | 78 (17.3)  |
| Never                                                               | 14 (3.1)   |
| <b>Frequency of recording herbal medicine use in the pharmacy</b>   |            |
| Very often                                                          | 25 (5.5)   |
| Often                                                               | 82 (18.2)  |
| Sometimes                                                           | 151 (33.5) |
| Rarely                                                              | 127 (28.2) |
| Never                                                               | 66 (14.6)  |
| <b>Initiation of discussion about herbal medicines</b>              |            |
| Pharmacist-initiated                                                | 132 (29.3) |
| Patient-initiated                                                   | 170 (37.7) |
| Short discussion                                                    | 117 (25.9) |
| Extended discussion                                                 | 29 (6.4)   |
| Other                                                               | 3 (0.7)    |
| <b>Interest in discussing herbal medicines with patients</b>        |            |
| Yes                                                                 | 424 (94.0) |
| No                                                                  | 27 (6.0)   |

### Characteristics of Respondents

Table 1 presents the characteristics of the 451 community pharmacist respondents. Most respondents were female (69.2%) and aged 20 to 30 years (72.7%). The majority were not married or divorced (66.5%), and almost all held a pharmacist degree as their highest educational qualification (90.0%). More than half of the respondents practiced in pharmacies located in central Indonesia (55.0%).

Most respondents had worked in their current pharmacy for one to five years (86.3%) and were employed in only one pharmacy (82.0%). More than half reported that their

workplace had only one pharmacist (54.1%). Working hours varied, with 38.6% reporting more than 60 working hours per week, followed by 36.6% working 21 to 40 hours weekly. Most pharmacists worked in independent pharmacies (77.2%). The number of pharmaceutical technicians in each pharmacy was relatively balanced, with 28.2% having one technician, 36.6% having two, and 35.3% having three or more technicians.

Half of the respondents worked in pharmacies where a medical doctor also practiced (50.3%). Regarding herbal medicine-related training, more than half had never received continuing education on the rational use of herbal medicines (55.0%) or training on assisting patients in selecting herbal products



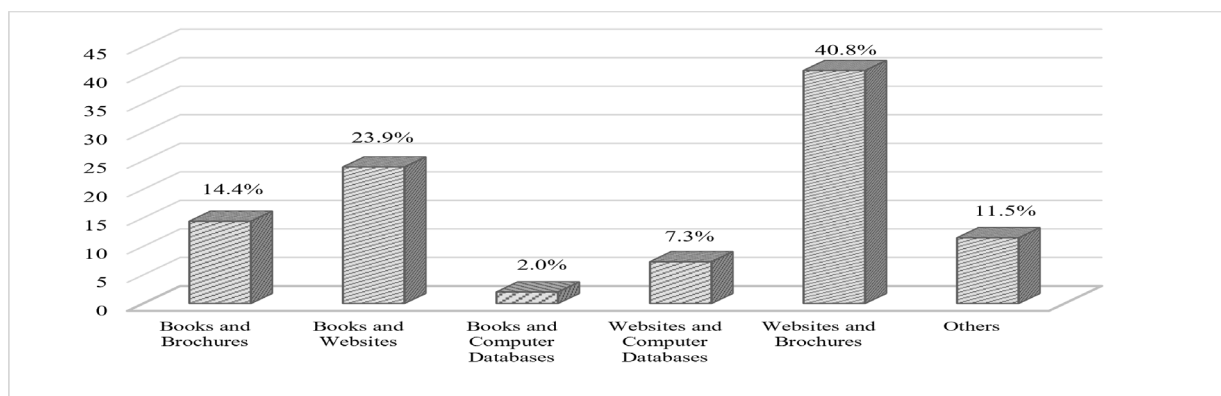


**Figure 1.** Distribution of information sources available and utilized by pharmacists in community pharmacies

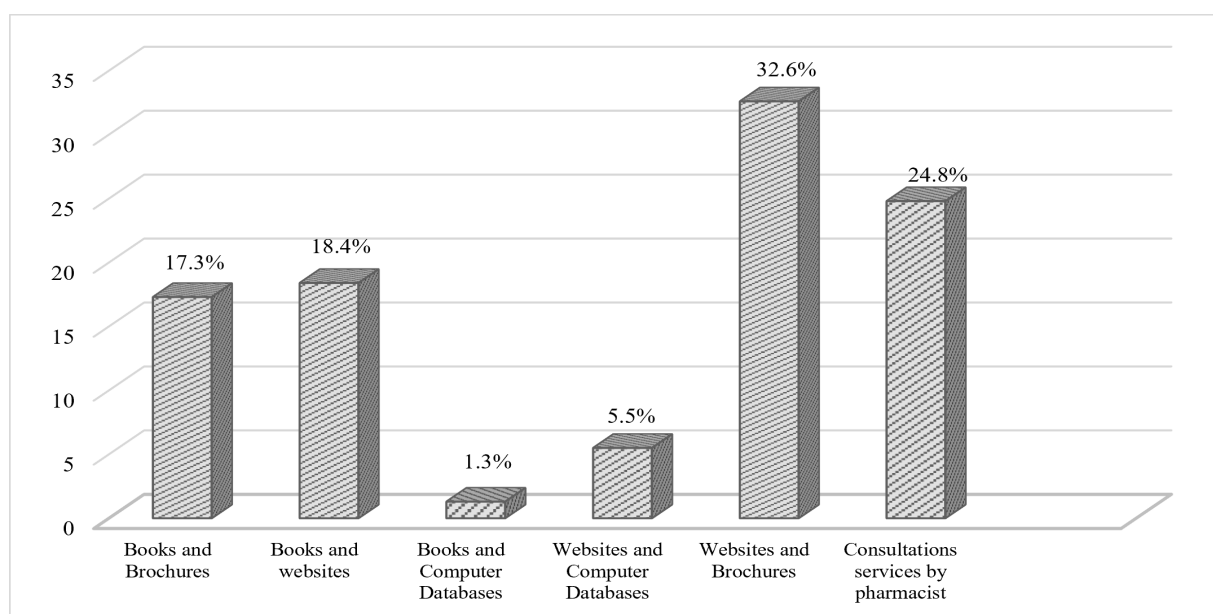


**Figure 2.** Distribution of information sources perceived as useful by pharmacists for educating patients about herbal medicine use

(60.5%). Despite this, most respondents had accessed herbal medicine information at their workplace (87.6%) and sold herbal medicine products in their pharmacies (88.9%).

In daily practice, more than half reported sometimes discussing herbal medicine use with patients (51.0%). Documentation of herbal medicine use varied, with 33.5% doing so sometimes and 28.2% rarely. Discussions about herbal medicines were most often initiated by patients (37.7%), followed by pharmacist-initiated conversations (29.3%). Finally, almost all respondents expressed an interest in discussing herbal medicine with their patients (94.0%).

#### Distribution of Herbal Information Sources

Figure 1 illustrates the distribution of information sources available and utilized by pharmacists in community pharmacies. The most frequently accessed sources were websites and brochures (40.8%); followed by books and websites (23.9%);

and books and brochures (14.4%). Smaller proportions of respondents reported accessing websites and computer databases (7.3%) or books and computer databases (2.0%). Additionally, (11.5%) of pharmacists relied on other types of information sources.

#### Pharmacist's Preferred Sources for Herbal Medicine Education

Figure 2 depicts the distribution of information sources perceived as useful by pharmacists for educating patients about herbal medicine use. Websites and brochures were considered the most useful source (32.6%), followed by pharmacist consultation services (24.8%). Books combined with websites (18.4%) and books combined with brochures (17.3%) were also commonly selected. Fewer respondents identified websites and computer databases (5.5%) or books and computer databases (1.3%) as useful. No respondents selected other types of information sources.

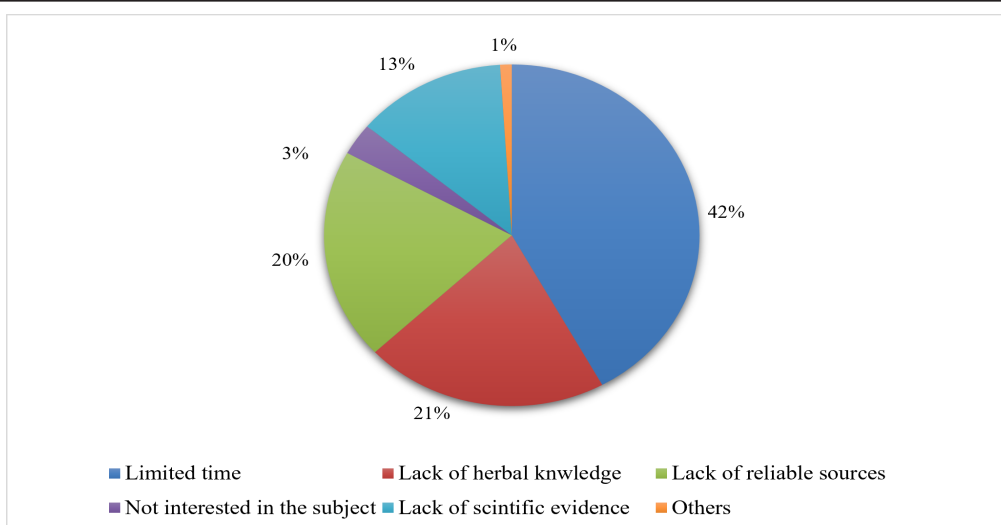


**Figure 3.** Barriers preventing pharmacists from engaging in discussions about herbal medicines with patients

| <b>Table 2.</b> Relationship between access to herbal medicine information and pharmacists' experience and practices in community pharmacies |                                                    |                                                          |                |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------|----------------|
| <b>Variables</b>                                                                                                                             | <b>Accessed information about herbal medicines</b> | <b>Did not access information about herbal medicines</b> | <b>p-value</b> |
| <b>Continuing education on rational use of herbal medicines</b>                                                                              |                                                    |                                                          | 0.008          |
| Yes                                                                                                                                          | 187 (47.3%)                                        | 16 (28.6%)                                               |                |
| No                                                                                                                                           | 208 (52.7%)                                        | 40 (71.4%)                                               |                |
| <b>Training on assisting patients in selecting and using herbal medicines</b>                                                                |                                                    |                                                          | 0.003          |
| Yes                                                                                                                                          | 166 (42.0%)                                        | 12 (21.4%)                                               |                |
| No                                                                                                                                           | 229 (58.0%)                                        | 44 (78.6%)                                               |                |
| <b>Sell of herbal medicines in the pharmacy</b>                                                                                              |                                                    |                                                          | 0.719          |
| Yes                                                                                                                                          | 352 (89.1%)                                        | 49 (87.5%)                                               |                |
| No                                                                                                                                           | 43 (10.9%)                                         | 7 (12.5%)                                                |                |
| <b>Frequency of discussing herbal medicines with patients</b>                                                                                |                                                    |                                                          | 0.001          |
| Very often                                                                                                                                   | 28 (7.1%)                                          | 1 (1.8%)                                                 |                |
| Often                                                                                                                                        | 98 (24.8%)                                         | 2 (3.6%)                                                 |                |
| Sometimes                                                                                                                                    | 205 (51.9%)                                        | 25 (44.6%)                                               |                |
| Rarely                                                                                                                                       | 60 (15.2%)                                         | 18 (32.1%)                                               |                |
| Never                                                                                                                                        | 4 (1.0%)                                           | 10 (17.9%)                                               |                |
| <b>Frequency of documenting herbal medicine use</b>                                                                                          |                                                    |                                                          | 0.001          |
| Very often                                                                                                                                   | 25 (6.3%)                                          | 0 (0.0%)                                                 |                |
| Often                                                                                                                                        | 80 (20.3%)                                         | 2 (3.6%)                                                 |                |
| Sometimes                                                                                                                                    | 133 (33.7%)                                        | 18 (32.1%)                                               |                |
| Rarely                                                                                                                                       | 111 (28.1%)                                        | 16 (28.6%)                                               |                |
| Never                                                                                                                                        | 46 (11.6%)                                         | 20 (35.7%)                                               |                |
| <b>Interest in discussing herbal medicines with patients</b>                                                                                 |                                                    |                                                          | 0.001          |
| Yes                                                                                                                                          | 379 (95.9%)                                        | 45 (80.4%)                                               |                |
| No                                                                                                                                           | 16 (4.1%)                                          | 11 (19.6%)                                               |                |

### Barriers to Herbal Medicine Discussion

Figure 3 illustrates the barriers that prevent pharmacists from engaging in discussions about herbal medicines with patients. The most commonly reported barrier was limited time (42%), followed by a lack of knowledge about herbal products (21%). The limited availability of reliable information sources (20%) and insufficient scientific evidence (13%) were also frequently mentioned. Only a small proportion of pharmacists indicated a lack of interest in the subject (3%), and 1% identified other contributing factors.

### Herbal Information Access and Practice

Table 2 presents the relationship between access to herbal medicine information and pharmacists' experience and practice patterns. A significant association was found between access to information and participation in continuing education on the rational use of herbal medicines ( $p = 0.008$ ), as well as training on assisting patients in selecting and using herbal products appropriately ( $p = 0.003$ ). Pharmacists who did not access herbal medicine information were more likely to have never taken part in these training activities.

Access to information was not significantly associated with the practice of selling herbal medicines ( $p = 0.719$ ). However, significant associations were observed between information access and the frequency of discussing herbal medicines with patients ( $p = 0.001$ ), documenting herbal medicine use ( $p = 0.001$ ), and interest in engaging in such discussions ( $p = 0.001$ ). For both discussion and documentation practices, "sometimes" remained the most frequently reported category across groups.

### Current Pharmacists Practices Regarding Herbal Medicines

Table 3 presents the relationship between herbal medicine sales practices and pharmacists' frequency of discussing and documenting herbal medicine use. The results indicate that selling herbal medicines was not significantly associated with how frequently pharmacists discussed herbal medicine use with patients ( $p = 0.171$ ) or how often they documented such use ( $p = 0.355$ ). Across both groups, those who sold herbal medicines and those who did not, the majority of pharmacists reported discussing and documenting herbal medicine use only occasionally.

### Continuing Education on Herbal Medicines and Pharmacists' Discussion and Documentation Practices

Although continuing education was not significantly associated with herbal medicine sales practices ( $p = 0.649$ ), it was significantly related to both the frequency of discussions ( $p = 0.001$ ) and documentation practices ( $p = 0.001$ ) (Table 4). Pharmacists who had received continuing education were more likely to report discussing and documenting herbal medicine use more frequently compared with those who had not participated in such training.

### Weekly Working Hours and Pharmacists' Responses to Herbal Medicine Use

Table 5 shows no significant association between weekly working hours and herbal medicine-related services ( $p > 0.05$ ). Access to information was consistently high across all groups, with no meaningful variation.

Participation in continuing education and counseling-focused training was generally limited, particularly among pharmacists working 41–60 hours per week. However, these differences were not statistically significant ( $p = 0.401$ ;  $p = 0.129$ ).

The sale of herbal products was widely practiced in all groups, without significant differences ( $p = 0.929$ ). Discussion and documentation activities were most commonly reported as occurring "sometimes." Although minor variations were observed in the frequency of these practices across working-hour categories, they did not reach statistical significance ( $p = 0.097$ ;  $p = 0.167$ ).

Overall, weekly working hours were not associated with differences in information access, training participation, sales practices, or professional behaviors related to herbal medicine.

### Herbal Medicine Discussion–Documentation Relationship Among Pharmacists

Table 6 demonstrates a statistically significant association between pharmacists' discussions with patients regarding herbal medicine use and the documentation of such information ( $p = 0.001$ ). The moderate positive correlation ( $p = 0.563$ ) suggests that pharmacists who more frequently initiate discussions are also more likely to document herbal medicine use. The kappa value ( $\kappa = 0.355$ ) further indicates moderate behavioural agreement, implying that these practices tend to co-occur.

Nevertheless, the overall frequency of both activities remains low. Most pharmacists reported engaging in discussion and documentation only occasionally or rarely, indicating that these practices have not yet been systematically incorporated into routine workflow. This finding suggests that while awareness and behavioural linkage exist, structural or practical barriers may limit consistent implementation in Indonesian community pharmacies.

## DISCUSSION

This national survey provides new evidence on the extent to which community pharmacists in Indonesia counsel patients on herbal medicines and document such use in practice. Although nearly all respondents expressed interest in counseling patients about herbal products, both counseling and documentation activities were conducted infrequently. This gap between positive attitudes and limited implementation echoes findings from other countries with high herbal medicine use, including Saudi Arabia, the United Arab Emirates, and Malaysia,

| <b>Table 3.</b> Association between herbal medicine sales practices and pharmacists' frequency of discussing and documenting herbal medicine use |                       |                              |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------------|---------|
| Variables                                                                                                                                        | Sell herbal medicines | Do not sell herbal medicines | p-value |
| <b>Frequency of discussing herbal medicines with patients</b>                                                                                    |                       |                              | 0.171   |
| Very often                                                                                                                                       | 28 (7.1%)             | 1 (1.8%)                     |         |
| Often                                                                                                                                            | 98 (24.8%)            | 2 (3.6%)                     |         |
| Sometimes                                                                                                                                        | 205 (51.9%)           | 25 (44.6%)                   |         |
| Rarely                                                                                                                                           | 60 (15.2%)            | 18 (32.1%)                   |         |
| Never                                                                                                                                            | 4 (1.0%)              | 10 (17.9%)                   |         |
| <b>Frequency of documenting herbal medicine use</b>                                                                                              |                       |                              | 0.355   |
| Very often                                                                                                                                       | 25 (6.3%)             | 0                            |         |
| Often                                                                                                                                            | 80 (20.3%)            | 2 (3.6%)                     |         |
| Sometimes                                                                                                                                        | 133 (33.7%)           | 18 (32.1%)                   |         |
| Rarely                                                                                                                                           | 111 (28.1%)           | 16 (28.6%)                   |         |
| Never                                                                                                                                            | 46 (11.6%)            | 20 (35.7%)                   |         |

| <b>Table 4.</b> Association between continuing education on herbal medicines and pharmacists' discussion and documentation practices in community pharmacies |                               |                         |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------|---------|
| Variables                                                                                                                                                    | Received continuing education | No continuing education | p-value |
| <b>Herbal medicine sales practice</b>                                                                                                                        |                               |                         | 0.649   |
| Yes                                                                                                                                                          | 182 (89.7%)                   | 219 (88.3%)             |         |
| No                                                                                                                                                           | 21 (10.3%)                    | 29 (11.7%)              |         |
| <b>Frequency of discussing herbal medicines with patients</b>                                                                                                |                               |                         | 0.001   |
| Very often                                                                                                                                                   | 20 (9.9%)                     | 9 (3.6%)                |         |
| Often                                                                                                                                                        | 67 (33.0%)                    | 33 (13.3%)              |         |
| Sometimes                                                                                                                                                    | 85 (41.9%)                    | 145 (63.0%)             |         |
| Rarely                                                                                                                                                       | 25 (12.3%)                    | 53 (21.4%)              |         |
| Never                                                                                                                                                        | 6 (3.0%)                      | 8 (3.2%)                |         |
| <b>Frequency of documenting herbal medicine use</b>                                                                                                          |                               |                         | 0.001   |
| Very often                                                                                                                                                   | 19 (9.4%)                     | 6 (2.4%)                |         |
| Often                                                                                                                                                        | 50 (24.6%)                    | 32 (12.9%)              |         |
| Sometimes                                                                                                                                                    | 73 (36.0%)                    | 78 (31.5%)              |         |
| Rarely                                                                                                                                                       | 40 (19.7%)                    | 87 (35.1%)              |         |
| Never                                                                                                                                                        | 21 (10.3%)                    | 45 (18.1%)              |         |

suggesting that the issue is not unique to Indonesia but reflects broader structural and educational challenges within pharmacy practice internationally<sup>15,18,22</sup>.

### Key Findings in Context

Limited time and insufficient knowledge emerged as the most frequently reported barriers to counseling, consistent with international literature<sup>18</sup>. Our findings add nationally representative insight into how these barriers manifest in Indonesian community pharmacies. Despite the widespread availability of herbal products and pharmacists' demonstrated willingness to discuss them, counseling and documentation

were generally performed only occasionally. This pattern indicates a potentially unmet need among patients for reliable guidance, as well as underutilized professional capacity within community pharmacies<sup>21-23</sup>.

### Theoretical Interpretation: Knowledge–Attitude–Practice Model

The Knowledge–Attitude–Practice (KAP) model offers a coherent explanation for the patterns observed<sup>19</sup>. Access to evidence-based information and participation in training represent the “knowledge” dimension. In this study, pharmacists who had received continuing education or accessed



| Table 5. Association between weekly working hours and pharmacists’ responses to herbal medicine use in community pharmacies |            |             |             |             |         |
|-----------------------------------------------------------------------------------------------------------------------------|------------|-------------|-------------|-------------|---------|
| Variables                                                                                                                   | < 20 hours | 21–40 hours | 41–60 hours | > 60 hours  | p-value |
| Access to herbal medicine information                                                                                       |            |             |             |             |         |
| Yes                                                                                                                         | 70 (83.3%) | 143 (86.7%) | 22 (78.6%)  | 160 (92.0%) | 0.083   |
| No                                                                                                                          | 14 (16.7%) | 22 (13.3%)  | 6 (21.4%)   | 14 (8.0%)   |         |
| Continuing education on rational use of herbal medicines                                                                    |            |             |             |             |         |
| Yes                                                                                                                         | 41 (48.8%) | 71 (43.0%)  | 9 (32.1%)   | 82 (47.1%)  | 0.401   |
| No                                                                                                                          | 43 (51.2%) | 94 (57.0%)  | 19 (67.9%)  | 92 (52.9%)  |         |
| Training on assisting patients with herbal product selection                                                                |            |             |             |             |         |
| Yes                                                                                                                         | 39 (46.4%) | 63 (38.2%)  | 6 (21.4%)   | 70 (40.2%)  | 0.129   |
| No                                                                                                                          | 45 (53.6%) | 102 (61.8%) | 22 (78.6%)  | 104 (59.8%) |         |
| Herbal medicine sales practices                                                                                             |            |             |             |             |         |
| Yes                                                                                                                         | 74 (88.1%) | 148 (89.7%) | 24 (85.7%)  | 155 (89.1%) | 0.929   |
| No                                                                                                                          | 10 (11.9%) | 17 (10.3%)  | 4 (14.3%)   | 19 (10.9%)  |         |
| Frequency of discussing herbal medicines with patients                                                                      |            |             |             |             |         |
| Very often                                                                                                                  | 3 (3.6%)   | 12 (7.3%)   | 0 (0.0%)    | 14 (8.0%)   | 0.097   |
| Often                                                                                                                       | 17 (20.2%) | 26 (15.8%)  | 8 (28.6%)   | 49 (28.2%)  |         |
| Sometimes                                                                                                                   | 41 (48.8%) | 90 (54.5%)  | 15 (53.6%)  | 84 (48.3%)  |         |
| Rarely                                                                                                                      | 21 (25.0%) | 31 (18.8%)  | 3 (10.7%)   | 23 (13.2%)  |         |
| Never                                                                                                                       | 2 (2.4%)   | 6 (3.6%)    | 2 (7.1%)    | 4 (2.3%)    |         |
| Frequency of documenting herbal medicine use                                                                                |            |             |             |             |         |
| Very often                                                                                                                  | 5 (6.0%)   | 9 (5.5%)    | 1 (3.6%)    | 10 (5.7%)   | 0.167   |
| Often                                                                                                                       | 11 (13.1%) | 24 (14.5%)  | 7 (25.0%)   | 40 (23.0%)  |         |
| Sometimes                                                                                                                   | 23 (27.4%) | 58 (35.2%)  | 13 (46.4%)  | 57 (32.8%)  |         |
| Rarely                                                                                                                      | 25 (29.8%) | 51 (30.9%)  | 5 (17.9%)   | 46 (26.4%)  |         |
| Never                                                                                                                       | 20 (23.8%) | 23 (13.9%)  | 2 (7.1%)    | 21 (12.1%)  |         |

| Table 6. Association between herbal medicine discussion and documentation practices |                     |        |           |        |       |        |                        |       |         |
|-------------------------------------------------------------------------------------|---------------------|--------|-----------|--------|-------|--------|------------------------|-------|---------|
|                                                                                     | Recording Frequency |        |           |        |       | Total  | Spearman correlation's | Kappa | P-value |
| Discussion Frequency                                                                | Very Often          | Often  | Sometimes | Rarely | Never |        | 0.563                  | 0.355 | 0.001   |
| Very often                                                                          | 14                  | 6      | 5         | 0      | 0     | 25     |                        |       |         |
| % Total                                                                             | 3.10%               | 1.30%  | 1.10%     | 0%     | 0%    | 5.50%  |                        |       |         |
| Often                                                                               | 7                   | 53     | 19        | 1      | 2     | 82     |                        |       |         |
| % Total                                                                             | 1.60%               | 11.80% | 4.20%     | 0.20%  | 0.40% | 18.20% |                        |       |         |
| Sometimes                                                                           | 5                   | 24     | 112       | 10     | 0     | 151    |                        |       |         |
| % Total                                                                             | 1.10%               | 5.30%  | 24.80%    | 2.20%  | 0     | 33.50% |                        |       |         |
| Rarely                                                                              | 0                   | 11     | 67        | 48     | 1     | 127    |                        |       |         |
| % Total                                                                             | 0%                  | 2.40%  | 14.90%    | 10.60% | 0.20% | 28.20% |                        |       |         |
| Never                                                                               | 3                   | 6      | 27        | 19     | 11    | 66     |                        |       |         |
| % Total                                                                             | 0.70%               | 1.30%  | 6.00%     | 4.20%  | 2.40% | 14.60% |                        |       |         |

herbal medicine information were significantly more likely to discuss and document herbal use. Improved knowledge may enhance confidence (representing the “attitude” component) particularly when addressing questions about safety, efficacy, dosage, and potential herb–drug interactions. These attitudes, in turn, influence the “practice” of counseling and recording patient information.

The moderate positive correlation between counseling and documentation reinforces this model: pharmacists who engage in conversations with patients are more likely to incorporate documentation into their workflow<sup>25,26</sup>. However, the notable discrepancy between the high level of expressed interest (94%) and the relatively low levels of routine practice suggests that knowledge alone is insufficient without supporting systems, standardized counseling protocols, and accessible evidence-based resources. This knowledge–behavior gap mirrors findings in other areas of clinical pharmacy practice and highlights the need for multifaceted professional development.

### Information Access and Practice Implications

Websites and brochures were the most frequently accessed information sources, whereas evidence-based databases and academic resources were less commonly used<sup>27</sup>. While online resources offer convenience, the variable quality of such information raises concerns. Limited use of authoritative databases may reflect lack of access, insufficient training, or time constraints. From a pharmacoepidemiological perspective, this reliance on less robust sources could reduce pharmacists’ ability to detect herb–drug interactions, contraindications, or adverse effects.

As the use of herbal medicines continues to expand in Indonesia, pharmacists have a crucial role in safeguarding patient safety. Improved access to high-quality herbal medicine information systems would strengthen their ability to provide consistent, evidence-based counseling. Equally important, stronger documentation practices would contribute valuable data to national pharmacovigilance systems, especially given the limited safety evidence for herbal products in Indonesia and many other LMIC settings.

Strengthening the role of pharmacists in herbal counseling aligns with national efforts to integrate traditional and complementary medicine into the healthcare system. A workforce equipped with appropriate training and supported by reliable information systems can serve as a frontline mechanism for guiding safe herbal medicine use.

### Strengths and Limitations

This study provides a comprehensive overview of pharmacists’ practices, perceived barriers, and information needs related to herbal medicine use in community pharmacies in Indonesia. Nevertheless, several limitations should be considered when interpreting the findings. First, the survey was distributed

online through social media and professional communication platforms commonly used by pharmacists in Indonesia. Because the survey link was disseminated through open networks, the total number of pharmacists who received or viewed the invitation could not be determined, and therefore a response rate could not be calculated. This approach may also have introduced self-selection bias, as pharmacists who were more active on digital platforms or had a greater interest in herbal medicine may have been more likely to participate.

Second, the sample included a relatively high proportion of younger pharmacists, with 72.7% of respondents aged 20–30 years. This may partly reflect the workforce distribution within community pharmacy practice in Indonesia, where early-career pharmacists are more commonly employed in patient-facing roles such as community pharmacies, hospitals, and primary care clinics<sup>28</sup>. Additionally, younger professionals may be more likely to participate in online surveys, which could further contribute to their higher representation in the sample. Similar pattern of age distributions have been reported in previous online surveys conducted among Indonesian pharmacists<sup>29–31</sup>.

In addition, the geographic distribution of respondents was not evenly balanced across regions, which may limit the generalizability of the findings. Because the study relied on self-reported data, the results may also be subject to recall bias and social desirability bias. Finally, the cross-sectional design of this study limits the ability to establish causal relationships between pharmacists’ characteristics and their practices related to herbal medicine use. Despite these limitations, the findings provide useful insights into current practice patterns and gaps in herbal medicine counseling and information resources among community pharmacists in Indonesia.

### Future Research

Future studies should explore workflow barriers and contextual factors using qualitative designs, such as interviews or focus groups. Longitudinal studies assessing the impact of continuing professional education, improved database access, and structured training programs on counseling behavior would also be valuable. Integrating pharmacists’ documentation of herbal medicine use into pharmacoepidemiological surveillance frameworks may generate new evidence on the safety profiles of commonly used products and strengthen national monitoring systems.

### CONCLUSION

Community pharmacists in Indonesia demonstrated generally positive attitudes toward herbal medicines, with the majority expressing strong interest in counseling patients about their use. However, actual practice remains limited, as both counseling and documentation of herbal medicine use were reported to occur only occasionally. Although a moderate and statistically significant correlation was observed between these two activities, this did not translate into consistent routine



practice.

Time constraints and insufficient knowledge were the most frequently reported barriers to counseling, followed by concerns regarding the lack of scientific evidence and limited access to reliable information sources. Pharmacists predominantly relied on websites and brochures for herbal medicine information, while the use of evidence-based resources such as academic or computer databases remained low.

These findings underscore the need to strengthen pharmacists'

access to credible, evidence-based information systems and to expand training opportunities that support rational, safe, and evidence-informed herbal medicine counseling in community pharmacy settings. Enhancing these capacities will be essential to optimizing pharmacists' roles in guiding appropriate herbal medicine use and contributing to improved patient safety.

## CONFLICT OF INTEREST

We declare no conflict of interest.

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