Jurnal Jamu Indonesia (2026) 11(6): 502–508
https://jamu-journal.ipb.ac.id/index.php/JJI/index

ISSN 2407-7178
eISSN 2407-7763

Research Article
DOI: https://doi.org/10.29244/jji.v11i6.580

# Traditional Medicine Use and Pharmacist Involvement Among Patients with Diabetes and Hypertension in Semarang, Indonesia: A Cross-sectional Study

## Penggunaan Obat Tradisional dan Keterlibatan Apoteker pada Pasien Diabetes dan Hipertensi di Semarang, Indonesia: Studi Potong Lintang

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**ARTICLE INFO**

*Article history:*
Received on: 2026-09-12
Revised on: 2026-09-24
Accepted on: 2026-09-24
Published on: 2026-11-02

*Keywords:*
Diabetes mellitus
Herb–drug interaction
Hypertension
Pharmacist
Traditional medicine

**ABSTRACT**

Patients with diabetes or hypertension often take traditional medicine alongside prescribed drugs, yet little is known about how they involve pharmacists in that use. This descriptive cross-sectional study enrolled 110 adult users of traditional medicine, recruited by purposive sampling at a community health centre and a private clinic in Semarang, Indonesia, and surveyed them with a structured questionnaire. Their mean age was 59.5 ± 10.3 years, 77.3% were women and 73.6% had diabetes. Ginger (40.9%), turmeric (39.1%) and Indonesian bay leaf (34.5%) were the remedies named most often. Pharmacists were seldom involved: 78.2% of respondents had never discussed their remedies with a pharmacist, 81.8% had never asked a pharmacist for information about them and 78.2% had never reported a side effect to one. Meanwhile, 46.4% always or often combined remedies with prescribed drugs without consulting a doctor. Community pharmacists are well placed to close this counselling gap.

*Kata kunci:*

Apoteker
Diabetes melitus
Hipertensi
Interaksi obat–herbal
Obat tradisional

**ABSTRAK**

Pasien diabetes atau hipertensi sering menggunakan obat tradisional bersamaan dengan obat resep, tetapi belum banyak diketahui bagaimana mereka melibatkan apoteker dalam penggunaan tersebut. Penelitian potong lintang deskriptif ini melibatkan 110 pasien dewasa pengguna obat tradisional yang direkrut secara purposive sampling di sebuah puskesmas dan sebuah klinik swasta di Semarang, Indonesia, dan datanya dikumpulkan dengan kuesioner terstruktur. Rerata usia responden 59,5 ± 10,3 tahun, 77,3% perempuan, dan 73,6% menderita diabetes. Jahe (40,9%), kunyit (39,1%), dan daun salam (34,5%) paling sering disebut. Apoteker jarang dilibatkan: 78,2% responden tidak pernah mendiskusikan obat tradisionalnya dengan apoteker, 81,8% tidak pernah meminta informasi kepada apoteker, dan 78,2% tidak pernah melaporkan efek samping kepada apoteker. Sementara itu, 46,4% selalu atau sering menggabungkan obat tradisional dengan obat resep tanpa berkonsultasi dengan dokter. Apoteker komunitas berada pada posisi yang tepat untuk menutup kesenjangan konseling ini.

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**Citation**: Setiawati, M. C. N., Munisih, S., & da Rato, K. K. (2026). Traditional medicine use and pharmacist involvement among patients with diabetes and hypertension in Semarang, Indonesia: A cross-sectional study. *Jurnal Jamu Indonesia*, *11*(6), 502–508. https://doi.org/10.29244/jji.v11i6.580

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## 1. INTRODUCTION

Hypertension and diabetes are among the most prevalent chronic diseases and are major risk factors for cardiovascular disease (NCD Risk Factor Collaboration [NCD-RisC], 2021; Sun et al., 2022). Modern and traditional medicine rest on different therapeutic paradigms, yet many patients combine them in the course of long-term treatment (Alzahrani et al., 2021; Widayati et al., 2025). Traditional medicine, natural plant products and herbal medicine have been used throughout human history, above all to solve health problems (Ekor, 2014).

The use of herbal medicinal products and supplements has increased considerably over the past three decades, and people worldwide rely on them for part of their primary health care (Ekor, 2014; Welz et al., 2018). Traditional medicine is important throughout the world, but its practice faces significant challenges regarding safety (Ekor, 2014). The World Health Organization (WHO) estimates that around 80% of the population in developing countries use herbal products for their primary health care (Başaran et al., 2022).

Community pharmacists are often the most accessible health professionals for patients (Fatiha & Kittisopee, 2025; Santanello & Carr, 2019). Their responsibilities include giving sound information about traditional medicines, explaining potential side effects, drug interactions and the risk of harm, and providing professional services around that use (Thin et al., 2022). Patients who take natural remedies alongside treatment for a chronic disease should use them rationally, following their doctor's instructions, understanding the dose and consulting health professionals. Pharmacists, however, receive limited education on traditional and complementary medicines: a systematic review of 58 studies from 30 countries found that they lack the resources to inform the advice they give consumers (Ung et al., 2023), and barriers to counselling on herbal products persist (Ng et al., 2021).

Pooled data from 38 studies show that about half of adults with diabetes use complementary and alternative medicine and that roughly one in three do not disclose this use to health professionals (Alzahrani et al., 2021). In Indonesia, 51% of hypertensive and diabetic patients attending primary health centres in Yogyakarta used traditional medicine, all of them alongside prescribed drugs (Widayati et al., 2025). How such patients involve pharmacists in that use, whether they discuss it, seek information or report side effects, has not been described. This study therefore aimed to identify the traditional medicines used by patients with diabetes and hypertension in Semarang and to describe their practice in using them in relation to health professionals, especially pharmacists.

## 2. METHODS

### 2.1. Study Design, Setting and Sample Size

This research used a descriptive cross-sectional design. Data were collected between January and March 2026 at first-level health facilities in Semarang, the capital of Central Java Province: a government-owned community health centre (Puskesmas) and a privately owned clinic. The population comprised adult patients with diabetes and/or hypertension receiving treatment at those two facilities. Respondents were recruited by non-probability purposive sampling. The minimum sample size was calculated with the Slovin formula, $n = N / (1 + N e^2)$, for a population of 40,103 patients and a margin of error of 10%: 40,103 / 402.03 = 99.75, rounded up to 100 respondents.

### 2.2. Inclusion and Exclusion Criteria

Adults (≥18 years) who had been diagnosed with hypertension and/or diabetes, who currently use or previously used herbal medicine, natural remedies, or traditional medicine for their diabetes and hypertension. In addition, co-occurring conditions such as osteoarthritis and chronic kidney failure were included in the study. The patients had been on antihypertensive and antidiabetic medication for a minimum of 1 year and were willing to become respondents. Patients who had not completed the questionnaire and signed an informed consent form, as well as patients with psychiatric conditions and pregnant women, were excluded.

### 2.3. Data Collection and Instrument

Data were collected with a structured self-administered questionnaire adapted from an instrument that had passed content validation by two expert judges and a language comprehension test (Sasongko, 2025). The instrument covers socio-demographic data (sex, age, education level and diagnosis) and the knowledge, attitude and practice of using natural medicine; occupation and income were not included. The present analysis reports the socio-demographic section and the seven practice statements, each answered on a five-point scale from never to always; the knowledge and attitude sections were collected but are not reported here. Respondents also listed, in free text, the traditional medicines they used, how they prepared them and how much they spent per purchase, and more than one answer was allowed for the medicines and the preparation method.

### 2.4. Ethical Approval

The study was approved by the Health Research Ethics Committee of Sekolah Tinggi Ilmu Farmasi Yayasan Pharmasi Semarang (No. 818/EVM-NA/KEPK/STIFAR/EC/X/2025, dated 22 October 2025). Every respondent was told the purpose and procedure of the study and signed an informed consent form before completing the questionnaire. Participation was voluntary, and no identifying data were recorded beyond the initials used to prevent duplicate entries.

### 2.5. Data Analysis

Responses were tabulated and analysed descriptively. Socio-demographic variables and the seven practice statements are reported as frequencies and percentages of the 110 respondents; age is reported as mean ± standard deviation with the observed

range. Plant names written in free text were normalised before counting: spelling variants and local synonyms were mapped to one entry (for example *kunir* to *kunyit* for turmeric, and *sereh* or *sarai* to *serai* for lemongrass), and a respondent who named the same plant twice was counted once, so that Figure 1 reports the number of respondents who mentioned each plant rather than the number of mentions. Because more than one answer was allowed for the plants used and for the preparation method, those percentages do not sum to 100%.

## 3. RESULTS AND DISCUSSION

### 3.1. Respondent Characteristics

A total of 357 patients with diabetes and/or hypertension attending outpatient care at the primary health centre and the private clinic were screened. Of these, 110 (30.81%) met the inclusion criteria and were enrolled; their sociodemographic characteristics are presented in Table 1.

**Table 1.** Sociodemographic characteristics of the respondents (n = 110)

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Sex** | | |
| Man | 25 | 22.73 |
| Woman | 85 | 77.27 |
| **Diagnosis** | | |
| Hypertension (HT) | 19 | 17.27 |
| Diabetes mellitus (DM) | 81 | 73.64 |
| DM + HT | 10 | 9.09 |
| **Education level** | | |
| Never attended school | 5 | 4.55 |
| Elementary school | 43 | 39.09 |
| Junior high school | 26 | 23.64 |
| Senior high school | 30 | 27.27 |
| Bachelor's degree | 4 | 3.64 |
| Master's degree | 2 | 1.82 |
| **Age group** | | |
| < 60 years | 53 | 48.18 |
| ≥ 60 years | 57 | 51.82 |

*Note.* Age, mean ± SD (range): 59.53 ± 10.34 years (35–84). Occupation and income were not recorded in the questionnaire. DM, diabetes mellitus; HT, hypertension; SD, standard deviation.

The participants' age ranged from 35 to 84 years, with a mean of 59.53 ± 10.34 years, and 51.82% were 60 years or older. Women outnumbered men 85 to 25 (77.27%), a sex ratio of 3.4. Patients with diabetes alone far outnumbered those with hypertension alone (73.64% versus 17.27%), and 9.09% were diagnosed with both. Most respondents had little formal schooling: elementary school was the most common level of education (39.09%), and only 5.45% had a university degree. The sample thus resembles the older, female-predominant populations reported in other surveys of herbal use among patients with diabetes (Alzahrani et al., 2021).

### 3.2. Traditional Medicines Used

The traditional medicines the respondents named are shown in Figure 1. Together they named more than 60 different plants or preparations, and every respondent named at least one. Figure 1 shows the 33 remedies named by two or more respondents, together with mango ginger and white turmeric, which were named by one respondent each.

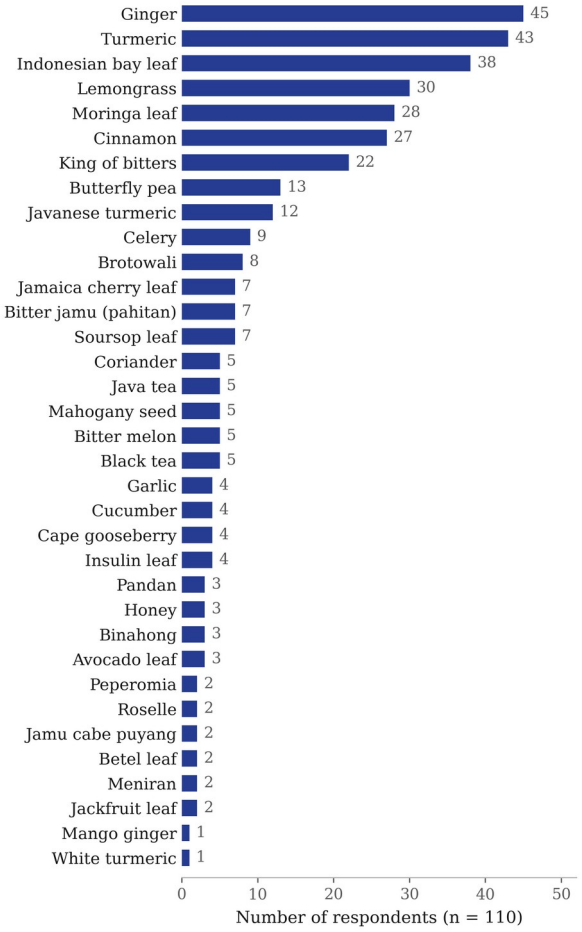


**Figure 1.** Traditional medicines reported by the respondents (n = 110). The figure shows the 33 remedies named by two or more respondents, plus mango ginger and white turmeric (one respondent each). More than one answer was allowed, so the counts sum to more than 110

In Figure 1, the traditional medicines reported most often were ginger, turmeric, Indonesian bay leaf, lemongrass and moringa leaf. All of these can be grown in a home yard, so respondents need not spend money to obtain them; the other remedies had to be bought at the market or at a herbal medicine shop. Spending was accordingly low: among the 57 respondents who stated an amount, the median cost per purchase was IDR 5,000 (range 1,000–250,000). Remedies named by a single respondent included apple cider vinegar, clove, lemon, black seed (*habbatussauda*), mangosteen peel, breadfruit leaf, papaya leaf, olive oil and sea cucumber extract.

The plant reported most often was ginger (*Zingiber officinale*), named by 45 respondents (40.9%). A meta-analysis of eight randomised trials in type 2 diabetes found that ginger improved HbA1c but not fasting blood glucose, which suggests an effect on

longer-term glycaemic control (Huang et al., 2019). In a cross-sectional study of 4,628 Chinese adults, daily ginger intake was associated with lower odds of hypertension (Wang et al., 2017), and a meta-analysis of six clinical trials found that ginger supplementation lowered both systolic and diastolic blood pressure (Hasani et al., 2019).

Turmeric ranked second, reported by 43 respondents (39.1%). It is the rhizome of *Curcuma longa* L. (Zingiberaceae), and its curcuminoids, which make up to about 10% of the dry powder, are regarded as its main active constituents (Prasad & Aggarwal, 2011). Curcumin has antihyperglycaemic and insulin-sensitising effects (Ghorbani et al., 2014; Marton et al., 2021). For blood pressure, a dose–response meta-analysis found that curcumin lowered diastolic pressure when given for 12 weeks or longer (Karimi et al., 2023), and in a randomised trial in patients with non-alcoholic fatty liver disease, the turmeric group had lower weight, BMI and systolic blood pressure after 12 weeks than at baseline (Kalhori et al., 2022).

Indonesian bay leaf (*Syzygium polyanthum* (Wight) Walp., Myrtaceae) came third, reported by 38 respondents (34.5%). The leaf is a common cooking spice in Indonesia and is also used as traditional medicine for diabetes, diarrhoea and hypertension; it contains essential oils, tannins and flavonoids (Arifah et al., 2022; Dewijanti et al., 2019). Reviews attribute its antidiabetic potential to these secondary metabolites (Widodo et al., 2023; Pratama, 2024), and a bay leaf decoction lowered blood pressure in women using three-monthly injectable contraception (Irmawati et al., 2024). Clinical evidence in patients with diabetes is still scarce, so the popularity of bay leaf in this sample probably rests more on tradition and availability than on trial data.

### 3.3. Practice in Using Traditional Medicine

The respondents' practice is summarised in **Table 2**. The most frequent answer was never for statements 2, 3, 5 and 6, always for statements 4 and 7, and sometimes for statement 1.

The first statement, "I use natural remedies to manage the hypertension or diabetes that I suffer from", was most often answered sometimes (42.7%), which suggests that traditional medicine is used as an adjunct rather than as the main therapy. Many respondents take it together with the drugs prescribed by their physician. This agrees with a study in Tanzania in which most patients combined oral antidiabetic drugs with natural medicines because they believed the combination made treatment more effective (Kasole et al., 2019).

For the second statement, "I read the label and product information before using natural remedies", more than half of the respondents (52.7%) answered never. This low level of practice probably reflects the preference for home-made forms, such as decoctions, over packaged products (Fahmy et al., 2010; Prasetya et al., 2025). In traditional use, information on dosage, directions and side effects is generally not available in writing, so respondents seldom pay attention to these aspects. The preparation data support this reading: 89.1% of respondents boiled their remedies and 25.5% steeped them, so most of what they took was prepared at home and carried no printed label at all.

For the third statement, "I reported the side effects of the natural medicine I experienced to the pharmacist", 78.2% of respondents answered never. They may not have recognised side effects at all, because many people assume that natural medicine is safe and has none (Setiawati et al., 2024). Herbal products are not inherently safer than conventional medicines: overviews of systematic reviews describe serious adverse events such as cerebral haemorrhage, kidney failure, liver damage, respiratory arrest, seizures and congestive heart failure (Posadzki et al., 2013), and nausea and vomiting were the side effects most often reported by consumers of herbal medicines in Jordan (El-Dahiyat et al., 2020).

### 3.4. Involvement of Pharmacists

The fourth statement, "I combined the use of natural remedies with prescription drugs without consulting a doctor first", drew always from 38.2% of respondents and often from a further 8.2%,

**Table 2.** Respondents' practice in using traditional medicine (n = 110)

| No. | Statement | Always n (%) | Often n (%) | Sometimes n (%) | Rarely n (%) | Never n (%) |
|---|---|---|---|---|---|---|
| 1 | I use natural remedies to manage the hypertension or diabetes that I suffer from | 24 (21.8) | 26 (23.6) | 47 (42.7) | 12 (10.9) | 1 (0.9) |
| 2 | I read the label and product information before using natural remedies | 14 (12.7) | 11 (10.0) | 11 (10.0) | 16 (14.5) | 58 (52.7) |
| 3 | I reported the side effects of the natural medicine I experienced to the pharmacist | 3 (2.7) | 3 (2.7) | 9 (8.2) | 9 (8.2) | 86 (78.2) |
| 4 | I combined the use of natural remedies with prescription drugs without consulting a doctor first | 42 (38.2) | 9 (8.2) | 11 (10.0) | 21 (19.1) | 27 (24.5) |
| 5 | I discussed the use of natural remedies with the pharmacist | 1 (0.9) | 3 (2.7) | 7 (6.4) | 13 (11.8) | 86 (78.2) |
| 6 | I look for information about natural remedies for treatment from a pharmacist | 2 (1.8) | 4 (3.6) | 3 (2.7) | 11 (10.0) | 90 (81.8) |
| 7 | I follow a healthy diet and exercise routine in addition to using natural remedies | 43 (39.1) | 34 (30.9) | 24 (21.8) | 6 (5.5) | 3 (2.7) |

*Note.* Each row sums to 110 respondents; percentages are of 110.

so 46.4% did so at least often; only 24.5% never did. Combining traditional medicines with oral antihyperglycaemic drugs calls for consultation with health workers (Alqathama et al., 2020), because herbs can alter the pharmacokinetics of these drugs or add to their effect, with a risk of hypoglycaemia or loss of efficacy (Thikekar et al., 2021). In a clinic population with diabetes or hypertension in Malawi, ginger and moringa, both common in the present sample, were among the herbal products taken with metformin, glibenclamide and antihypertensive drugs, and several of these combinations carried a plausible interaction risk (Nyirenda et al., 2025).

Pharmacists are expected to help patients weigh the evidence on the effectiveness and safety of herbal products, yet 78.2% of the respondents had never discussed their remedies with a pharmacist and only one (0.9%) always did (statement 5). Non-disclosure is common well beyond Semarang: pooled data suggest that about one in three adults with diabetes who use complementary medicine do not tell their health professionals (Alzahrani et al., 2021). On the pharmacists' side, limited education and training on herbal products, together with lack of time, leave many unable to counsel patients with confidence (Ng et al., 2021).

The sixth statement, "I look for information about natural remedies for treatment from a pharmacist", received the highest proportion of never responses (81.8%). Patients evidently do not yet see the pharmacist as a source of advice on herbal remedies, in line with evidence that public awareness of the pharmacist's role is uneven, which leaves pharmaceutical services under-used (Khoshnoud et al., 2025). Taken together, statements 3, 5 and 6 show that pharmacists are currently under-used in educating patients about traditional medicine and in monitoring its use, and that their role in preventing herb–drug interactions among chronic patients on several medicines needs to be strengthened.

For the last statement, "I follow a healthy diet and exercise routine in addition to using natural remedies", the most frequent answer was always (39.1%), and 70.0% answered always or often. Most patients therefore appear to understand that traditional medicine alone is not enough to control diabetes and hypertension and that non-pharmacological measures such as exercise and diet are part of treatment. This matters clinically: in a prospective study of 326 hypertensive patients, poor adherence to self-care activities, including medication intake, weight management and a low-salt diet, predicted uncontrolled blood pressure (Niriayo et al., 2025).

### 3.5. Limitations and Implications

Several limits bound what these results can say. Respondents were recruited by purposive sampling at two facilities in one city, so the figures describe those patients and cannot be generalised to patients with diabetes or hypertension in Indonesia as a whole. Use was self-reported at a single visit, with no verification of the product, the dose or the duration, and recall of the plants used is likely to be incomplete. Occupation and income were not recorded, so socio-economic position can be approximated only by education. Because eligibility required current or previous use of traditional medicine, the study describes how users behave and cannot estimate how common that use is among patients in general. What the results do support is a practical point for pharmacy services: patients who combine herbal remedies with prescribed drugs are largely doing so without professional advice, and the community pharmacy is the point of contact where that could change.

## 4. CONCLUSION

Among patients with diabetes and hypertension in Semarang who use traditional medicine, remedies were taken mostly alongside prescribed drugs rather than in place of them, and ginger, turmeric and Indonesian bay leaf were used most. Pharmacists were rarely involved: about four in five respondents had never discussed their remedies with a pharmacist or sought information from one, and nearly half combined remedies with prescribed drugs at least often without medical advice. Community pharmacists should ask routinely about herbal use when dispensing antidiabetic and antihypertensive drugs.

## AUTHOR CONTRIBUTIONS

Conceptualization, Maria Caecilia Nanny Setiawati and Siti Munisih; methodology, Maria Caecilia Nanny Setiawati; formal analysis, Klara Konsita da Rato; writing—original draft preparation, Maria Caecilia Nanny Setiawati and Klara Konsita da Rato; writing—review and editing, Maria Caecilia Nanny Setiawati; supervision, Siti Munisih All authors have read and agreed to the published version of the manuscript.

## INSTITUTIONAL REVIEW BOARD STATEMENT

The study was conducted in accordance with the Declaration of Helsinki and approved by the Health Research Ethics Committee of Sekolah Tinggi Ilmu Farmasi Yayasan Pharmasi Semarang (No. 818/EVM-NA/KEPK/STIFAR/EC/X/2025, dated 22 October 2025).

## INFORMED CONSENT STATEMENT

Informed consent was obtained from all subjects involved in the study.

## DATA AVAILABILITY STATEMENT

The data are not publicly available due to ethical restrictions.

## FUNDING

This research was funded by Sekolah Tinggi Ilmu Farmasi Yayasan Pharmasi Semarang.

## ACKNOWLEDGMENT

The research team thanks the health facilities that granted permission for the study and the patients with diabetes and hypertension who agreed to take part as respondents.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest.

## ROLE OF FUNDERS

The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

## DECLARATION OF GENERATIVE ARTIFICIAL INTELLIGENCE (AI) USE

The authors declare that no generative AI or AI-assisted technologies were used in the preparation or writing of this manuscript. All contents were produced entirely by the authors without any automated assistance.

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