The use of herbal medicines among chronic disease patients in Thailand: a cross-sectional survey

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Background: The study aimed to assess the prevalence and correlates of herbal medicine use among chronic disease patients in health care settings in Thailand.

Methods: In a cross-sectional study, 1374 adult chronic disease patients (median age 60 years) were consecutively sampled from health care facilities in Thailand. Logistic regression was used to estimate the independent predictors of herbal medicine use in the past 12 months.

Results: The prevalence of herbal medicine use in the past 12 months was 35.9%. Of participants who were using herbal medicine in the past 12 month, 53.7% used it for treating a long-term health condition, 40.0% used herbal medicine in order to improve well-being and 6.3% for treating an acute illness. More than half of the herbal medicine users (57.2%) rated their herbal medicine use as very helpful, 33.3% as somewhat helpful and 6.5% not at all helpful or do not know. In adjusted logistic regression analysis, having Grade 6 to 12 education (Odds Ratio-OR: 1.71, Confidence Interval-CI: 1.04, 2.82), rural residence (OR: 0.76, CI: 0.60, 0.97), other religion (OR: 0.57, CI: 0.35, 0.97), anxiety (OR: 1.64, CI: 1.25, 2.16), low quality of life (OR: 0.42, CI: 0.31, 0.56) and having multiple chronic conditions (OR: 1.82, CI: 1.30, 2.56) were associated with past 12-month herbal medicine use. Further, in adjusted logistic regression analysis, having arthritis, asthma, cancer, cardiovascular disease, dyslipidaemia, gastrointestinal disease, dyslipidaemia were positively and hypertension negatively associated with past 12-month herbal medicine use.

Conclusions: The study found a high prevalence of herbal medicine use among chronic disease patients in Thailand. Several factors (education, rural residence, anxiety, low quality of life and multiple chronic conditions) associated with herbal medicine use were identified. This knowledge will support health care providers and policy makers in decision making on the use of herbal medicine.

Keywords: herbal medicine, utilization, chronic disease patients, Thailand

Introduction

A large group of the population in “Association of Southeast Asian Nations (ASEAN)” states utilize traditional medicine.¹ The World Health Organization² highlights the relevance of studying the prevalence and correlates of traditional, including herbal medicine use.

Traditional herbal medicines are naturally occurring, plant-derived substances with minimal or no industrial processing that have been used to treat illness within local or regional healing practices.³

Under the Universal Health care Coverage Scheme of the National Health Security Office in Thailand, the treatment and rehabilitation with traditional herbal medicines or traditional recipes composing of medicinal plant materials is included.⁴
Although many populations in ASEAN countries reported to use herbal medicine to improve their health, there is limited data on Thailand.²⁻⁵

In Thailand, 10% of patients attending public health facilities receive various forms of Thai traditional medicine, including traditional herbal medicines.⁶ In a study of 105 patients in Bangkok, 28.6% had used herbal medicines.⁷ Among 200 medical in- and out-patients in Bangkok, 52.5% had used at least one form of alternative medicine (mostly herbal medicine).⁸ In a household survey in Bangkok, the prevalence of past 6-month herbal and dietary supplement use was 52.0%.⁹ Several studies in Thailand found a high prevalence of herbal medicine use in patients with specific chronic conditions, eg, among 50 admitted and 50 walk-in gynaecologic cancer patients 27.0% used herbal medicines,¹⁰ past 12-month use of 31.1% in cancer patients undergoing radiotherapy,¹¹ among diabetes patients past 3-month use of 20.1% took herbal medicine,¹² past 12-month use of 27.3% in Thai outpatients with chronic kidney disease,¹³ and among persons living with HIV, 32% had ever taken herbal treatment.¹⁴ We did not find any study in Thailand investigating the prevalence and correlates of herbal medicine use in chronic disease patients in general. Some investigations found that herbal medicine users were more likely to have one or multiple chronic conditions.¹⁵

The prevalence of past 12-month herbal medicine use among chronic disease patients in Cambodia was 44.5%,¹⁶ in Lao PDR 21.3%,¹⁷ in Malaysia 24.9%,¹⁸ Myanmar 53.2%,¹⁹ and Vietnam 43.6%.²⁰ Factors associated with herbal medicine use may include sociodemographic and well-being factors. Sociodemographic factors include, women,¹⁶ younger or older age,²² higher socioeconomic status,²¹,²² lower education,¹⁶ married,¹⁶ and urban residence.²⁰ Well-being factors include, perceived poor health status,²⁰,²¹ neither poor nor good quality of life,¹⁶ anxiety,²³ depression,²³ multiple chronic conditions,²⁰,²² arthritis,²³ hypertension,¹⁶ and gastrointestinal diseases.¹⁶

Commonly used herbal medicines utilized by chronic disease patients in Lao PDR included “Moringa pterygosperma, Curcuma longa L., Curcuma xanthorrhiza, Centella asiatica L. Mushroom’s Linchi, Morinda citrifolia L.”¹⁷ in Myanmar “Ganoderma lucidum, Menispermumdauricum, Garcinia mangostana, Asiatic Penny-wort, Aloe Vera L.”¹⁹ Vietnam “Curcumin, Gynostemma pentaphyllum, Ganoderma lucidum, Aloe Vera, Artichoke, Globe artichoke Cynara scolymus L.,1733– Asteraceae and Stypnolobium japonicum.”¹”²⁰ Among hospital patients in Thailand commonly used herbal medicines included “Zingiber officinale, Andrographis paniculata, Zingiber cassumunar, Capsicum frutescens and Curcuma longa”.⁷ In a household survey in Bangkok, herbal medicines used included “Andrographis paniculata, Curcuma Longa, Moringa spp., Aloe vera, and Boensenbergia spp.”⁹ and among Thai chronic kidney disease patients commonly used herb included “Andrographis paniculata, Curcuma longa, and Moringa oleifera”.¹³ The Ministry of Public Health in Thailand has included “71 herbal medicinal products into the National List of Essential Drugs.”²³,²⁴

The study aimed to assess the prevalence and correlates of herbal medicine use among chronic disease patients in health care settings in Thailand.

Methods

Design

In a cross-sectional survey, out-patients with chronic diseases in rural and urban health facilities in Thailand were interviewed.

Sample and procedure

Using consecutive sampling, chronic disease patients (21 years and older) were recruited from conveniently selected seven district hospitals across the whole country, more details have been described.³ Briefly, health facility staff conducted screening of two inclusion criteria (minimum age of 21 years and who had been treated in the past 12 months for any of 20 chronic conditions) and referred all eligible patients to the interviewers for data collection.⁵ Trained research assistants conducted interviews with the patients at the health care facilities, using structured questionnaires.⁵ The questionnaire was pre-tested for validity on a sample of 20 patients, which did not form part of the final sample. Written informed consent was obtained from each participant, and privacy and confidentiality of the respondents were strictly protected. The “Committee of Research Ethics (Social Sciences) of Mahidol University (COA. No.: 2014/193.0807)” approved the study protocol. The World Medical Association Declaration of Helsinki regarding ethical conduct of research involving human subjects was followed. The sample size included at least 1300 chronic disease patients, for an estimated prevalence of 25% herbal use with precision of ±2%.

Measures

The “International questionnaire to measure use of complementary and alternative medicine” (I-CAM-Q)²⁵ was used to assess the prevalence, purpose and benefits of past 12-month herbal medicine use. In addition, they were
“asked about the names of herbal medicines they are using, their purpose, form, usage and how obtained.”

Chronic diseases were assessed from a list of 22 conditions, such as diabetes and hypertension.

Sociodemographic variables included sex, age, educational level, marital status, religious affiliation, and residence status.

Anxiety and depression was assessed with the “Hospital Anxiety and Depression Scale (HADS)”, and participants scoring 11 or more on the HADS were classified as having moderate to severe anxiety and depression, respectively. 

Problem drinking was assessed with the “Alcohol Use Disorder Identification Test (AUDIT)-C”, with scores of four or more defining problem drinking.

Health related quality of life (HRQoL) was assessed with the “World Health Organization Quality of Life (WHOQoL)-8” and grouped into low, moderate and high HRQoL. 

Anticipated stigma was measured with the 12-item Chronic Illness Anticipated Stigma Scale (CIASS). The 12 CIASS items (range from 1=very unlikely to 5=very likely) are added up, and dichotomized based on a median score of 21 or more representing anticipated chronic disease stigma.

Data analysis
Frequencies, means, medians, standard deviations, and interquartile range were calculated to describe the sample. Chi-square tests were used to assess differences in proportion. Logistic regression was used to estimate the independent predictors (age, gender, marital status, residence type, religious affiliation, anxiety, depression, problem drinking, quality of life, number of chronic diseases and chronic disease stigma) of herbal medicine use in the past 12 months. Variables found significant (P<0.05) in bivariate analysis were subsequently included in the multivariable regression model. P<0.05 was considered significant. Statistical procedures were conducted using “IBM SPSS Statistics for Windows” (Version 25.0. Armonk, NY: IBM Corp.).

Results
Sample characteristics
Of 1416 participants approached, 1396 agreed to take part in the study (98.6% response rate) and 1374 had complete information on herbal medicine use. The median age of participants was 60 years (interquartile range=16 years, range 21–99 years), 60.8% were women, 61.6% had less than Grade 6 education, 94.7% were Buddhist and 50.4% resided in rural areas. About one in four of the participants (26.6%) had anxiety, 20.3% depression, 4.5% problem drinking, and 48.9% had high quality of life. Respondents had been treated in the past 12 months for hypertension (61.0%), followed by diabetes mellitus (34.9%), dyslipidaemia (29.7%), gout and other musculoskeletal conditions, such as chronic backache (15.0%), cardiovascular disorder (12.9%), arthritis (4.8%), asthma (4.2%) migraine or frequent headaches (4.1%), gastrointestinal disease (2.9%), thyroid disease (2.8%), kidney disease (2.5%), chronic obstructive pulmonary disease (2.3%), Parkinson’s disease (2.1%), mental disorder (1.9%), liver disease (1.5%), cancer (1.2%), and epilepsy (0.6%). About one-third of the participants (30.5%) had one chronic disease, 30.2% two and 39.3% three or more chronic diseases. The prevalence of past 12-month herbal medicine use was 35.9%. Of participants who were using herbal medicine in the past 12 month, 53.7% used it for treating a long-term health condition (>one month), 40.0% used herbal medicine in order to improve well-being and 6.3% for treating an acute illness (<one month). More than half of the herbal medicine users (57.2%) rated their herbal medicine use as very helpful, 33.3% as somewhat helpful and 6.5% not at all helpful or do not know. In bivariate analysis, gender (P=0.003), education (P=0.018), marital status (P=0.042), residence (P=0.008), religious affiliation (P=0.009), anxiety (P<0.001), quality of life (P<0.001) and number of chronic conditions (P<0.001) were associated with past 12-month herbal medicine use (see Table 1).

Associations with herbal medicine use by sociodemographic and well-being factors
In adjusted logistic regression analysis, having Grade 6 to 12 education (Odds Ratio-OR: 1.71, Confidence Interval-Cl: 1.04, 2.82) (P=0.036), rural residence (OR: 0.76, Cl: 0.60, 0.97) (P=0.026), other religion (OR: 0.57, Cl: 0.35, 0.97) (P=0.039), anxiety (OR: 1.64, Cl: 1.25, 2.16) (P<0.001), low quality of life (OR: 0.42, Cl: 0.31, 0.56) (P<0.001) and having multiple chronic conditions (OR: 1.82, Cl: 1.30, 2.56) (P<0.001) were associated with past 12-month herbal medicine use (see Table 2).

Associations with herbal medicine use by type of chronic disease
In adjusted logistic regression analysis, having arthritis (OR: 5.51, Cl: 3.12, 9.73), asthma (OR: 2.15, Cl: 1.24,
3.73), cancer (OR: 3.24, CI: 1.13, 9.26), cardiovascular disease (OR: 1.06, CI: 1.40, 2.76), dyslipidaemia (OR: 1.31, CI: 1.00, 1.70), gastrointestinal disease (OR: 4.82, CI: 2.33, 10.01), and migraine or frequent headaches (OR: 1.88, CI: 1.07, 3.31) were positively and hypertension (OR: 0.71, CI: 0.55, 0.91) negatively associated with past 12-month herbal medicine use (see Table 3).

Details of herbal medicines used
Most frequently specific herbal medicines used included a mixture of unspecified herbs for a range of problems (dia-

Table 1 Sample characteristics

| Variable                  | Sample | Herbal medicine use in the past 12 months | P-value |
|---------------------------|--------|------------------------------------------|---------|
|                           | All    | Yes (35.9) | No (64.4) |         |
| N (%)                     | 1374   | 489 (35.9) | 885 (64.4) |         |
| Age (in years)            |        |            |            |         |
| 18–45                     | 167 (12.2) | 53 (31.7) | 114 (68.3) | 0.493   |
| 46–60                     | 555 (40.6) | 204 (36.8) | 351 (63.2) |         |
| 61–101                    | 646 (47.2) | 231 (35.8) | 415 (64.2) |         |
| Gender                    |        |            |            |         |
| Female                    | 829 (60.8) | 276 (33.3) | 553 (66.7) | 0.033   |
| Male                      | 534 (39.2) | 208 (39.0) | 326 (61.0) |         |
| Education                 |        |            |            |         |
| <Grade 6                  | 844 (61.6) | 280 (33.2) | 564 (66.8) | 0.018   |
| Grade 6–12                | 308 (22.5) | 130 (42.2) | 178 (57.8) |         |
| Postsecondary             | 218 (15.9) | 78 (35.8)  | 140 (64.2) |         |
| Marital status            |        |            |            |         |
| Married                   | 978 (71.6) | 331 (33.8) | 647 (66.2) | 0.042   |
| Never married             | 388 (28.4) | 154 (39.7) | 234 (60.3) |         |
| Residence                 |        |            |            |         |
| Rural                     | 692 (50.4) | 270 (39.0) | 422 (61.0) | 0.008   |
| Urban                     | 682 (49.6) | 219 (32.1) | 463 (67.9) |         |
| Religious affiliation     |        |            |            |         |
| Buddhist                  | 1297 (94.7) | 452 (34.8) | 845 (65.2) | 0.009   |
| Other religion            | 72 (5.3) | 36 (50.0)  | 36 (50.0)  |         |
| Anxiety                   |        |            |            |         |
| Depression                | 361 (26.6) | 174 (48.2) | 306 (30.8) | <0.001  |
| Problem drinking          | 275 (20.3) | 110 (40.0) | 375 (34.8) | 0.108   |
| Quality of Life           |        |            |            |         |
| Low                       | 299 (21.9) | 157 (52.5) | 142 (47.5) | <0.001  |
| Medium                    | 399 (29.2) | 122 (30.6) | 277 (69.4) |         |
| High                      | 667 (48.9) | 207 (31.0) | 460 (69.0) |         |
| Chronic diseases          |        |            |            |         |
| One                       | 419 (30.5) | 103 (24.6) | 316 (75.4) | <0.001  |
| Two                       | 415 (30.2) | 147 (35.4) | 268 (64.6) |         |
| Three or more             | 540 (39.3) | 234 (43.4) | 306 (56.6) |         |
| Chronic disease stigma    | 1002 (74.4) | 368 (36.0) | 654 (64.0) | 0.581   |
betes, asthma, stroke, hypertension, muscle pain, etc.), *Andrographis paniculata* (Burm.f.) Wall.ex Nees for sore throat and diarrhoea, *Curcuma longa* Linn for health tonic, digestive tonic and knee pain, *Curcuma xanthorrhiza* Roxb. for pre-menopause symptoms and leucorrhoea and *Zingiber officinale* for cold and gastrointestinal problems. The most frequent type of herbal medicine use was “crude herbs, capsules, pills, and powder”, which were mainly “swallowed and making it into a drink or food using hot water”. Herbal medicines were mainly obtained from own garden, hospital, folk remedy shop or stand and drug store (see Table 4).

**Discussion**

Findings show a high prevalence of past 12-month herbal medicine use among chronic disease patients in Thailand confirms findings of lifetime, 12-month and past 3-month herbal medicine use in different study populations in Thailand: hospital patients 28.6%, gynaecologic cancer patients 27.0%, cancer patients treated with radiotherapy past-12-month use of 31.1%, diabetes patients past 3-month use of 20.1%, and 42% taking herbal medicine together with modern medication, chronic kidney disease patients past 12-month use of 27.3%, and among persons living with HIV lifetime use of 32%. Most chronic disease patients in this study reported that the use of herbal medicine was very or somewhat helpful (93.5%), which is similar to findings from a study among chronic disease patients in Jordan and Malaysia. The high herbal medicine use in Thailand may be related to promotion of the use of herbal medicines through the “National policy on Thai traditional medicine and the implementation” as well as the “Sufficiency Health System Strategic Plan”.

| Variable                  | AOR (95% CI)       | P-value |
|---------------------------|---------------------|---------|
| Gender                    |                     |         |
| Female                    | 1 (Reference)       |         |
| Male                      | 1.27 (0.98, 1.61)   | 0.067   |
| Education                 |                     |         |
| <Grade 6                  | 1 (Reference)       |         |
| Grade 6–12                | 1.71 (1.04, 2.82)   | 0.036   |
| Postsecondary             | 1.20 (0.93, 1.56)   | 0.163   |
| Marital status            |                     |         |
| Married                   | 1 (Reference)       |         |
| Never married             | 1.28 (0.98, 1.66)   | 0.069   |
| Residence                 |                     |         |
| Rural                     | 1 (Reference)       |         |
| Urban                     | 0.76 (0.60, 0.97)   | 0.026   |
| Religious affiliation     |                     |         |
| Other religion            | 1 (Reference)       |         |
| Buddhist                  | 0.57 (0.35, 0.97)   | 0.039   |
| Anxiety                   | 1.64 (1.25, 2.16)   | <0.001  |
| Quality of Life           |                     |         |
| Low                       | 1 (Reference)       |         |
| Medium                    | 0.47 (0.33, 0.66)   | <0.001  |
| High                      | 0.42 (0.31, 0.56)   | <0.001  |
| Chronic diseases          |                     |         |
| One                       | 1 (Reference)       |         |
| Two                       | 1.53 (1.11, 2.11)   | 0.010   |
| Three or more             | 1.82 (1.30, 2.56)   | <0.001  |

Abbreviation: AOR, Adjusted Odds Ratio.
emphasis on the use of Thai traditional medical knowledge and being self-reliant.4

Several studies20–22 found that being a woman and younger or older age were associated with herbal medicine use, while in this study only in bivariate analysis women had a higher prevalence of herbal medicine use than men had, and no age differences were found. This study found that having completed primary education increased the odds for herbal medicine use, while in a community survey in Turkey22 higher education was positively and among chronic disease patients in Cambodia16 was negatively associated with herbal medicine use. Consistent with some studies on traditional and complementary medicine utilization,17,19 this study found that rural residence increased the odds for herbal medicine use. In this study, rural residents obtained herbal medicines more often from their own garden, folk remedy shop or stand than urban residents (analysis not shown). It is possible that herbal medicines are better accessible in rural than urban areas in Thailand. Other religion (mainly Muslim) was associated with a higher prevalence of herbal medicine use than Buddhist communities do.

Consistent with previous studies,20–23 this study found that poorer well-being (low health related quality of life and anxiety) and having multiple chronic conditions were associated with herbal medicine use. Some of the reasons for these findings could be a need for more frequent herbal medicine treatment, greater desire for better management of chronic conditions or greater availability of herbal medicines.16 Other reasons could be that anxious patients are more likely to seek alternative, herbal medicine, treatment in an attempt to alleviate chronic disease symptoms.23 Further, having specific chronic conditions, arthritis, asthma, cancer, cardiovascular disease, dyslipidaemia, gastrointestinal disease and migraine or frequent headaches, increased and having hypertension decreased the odds for past 12-month herbal medicine use. Previous studies also found an association between arthritis,20 gastrointestinal diseases14 cancer33 and herbal medicine use. A previous study among chronic disease patients in Cambodia found a positive association but this study found a negative association between hypertension and herbal medicine use. It is possible that with better health care services in Thailand, Thai hypertensive patients rely more on modern than herbal medicine than their Cambodian counterparts.

Commonly herbal medicines used in this study included Andrograhis paniculata (Burm.f) Wall.ex Nees, Curcuma longa Linn, Curcuma xanthorrhiza Roxb. Zingiber officinale, Boesenbergia rotunda, Aloe vera (L.) Burm.f., Centella asiatica, some of which have also been commonly used among chronic disease patients in Jordan (Zingiber officinale),4 in Lao PDR (“Curcuma longa L., Curcuma xanthorrhiza, Centella asiatica L.”)17 Vietnam (Aloe vera, Curcuma longa L.),20 chronic kidney patients in Thailand (Curcuma longa, "Vietnam (".
**Table 4** Details of herbal medicine used

| Scientific name of herbal remedy | Local name of herbal remedy | Purpose of using it | Form | Usage | How obtained |
|----------------------------------|-----------------------------|---------------------|------|-------|--------------|
| Aloe vera (L.) Burm.f.           | Aloe Vera, Star Cactus      | Body pain           | 6, 2 | 1     | 2            |
| Andrographis paniculata (Burm.f.) Wall.ex Nees | Kariyat, The Crest, Far talai jone | Sore throat, diarrhea | 1,2,4,5,6 | 1,3 | 1,2,4,7 |
| Boesenbergia rotunda             | Allium, Garlic, Fingerroot. | Low cholesterol, osteoporosis | 6, 3 | 1,3 | 8, 5 |
| Caesalpinia sappan Linn.         | Sappan tree, Kan Fang       | Diabetes, health tonic, erectile dysfunction | 6 | 3 | 2,4,7 |
| Carissa carandas Linn.           | Carandas-plum, Ma moung how – ma now ho | Treat symptoms | 6 | 1 | 7 |
| Carthamus tinctorius L.          | Safflower, Dok kam foi      | Hypertension        | 4 | 3 | 4 |
| Gentiana asiatica (L.) Ugb       | Gotu kola, Bai bua boke    | Headache            | 6 | 1 | 7 |
| Gentiana lappacea (L.) Desv.     | Ya repair, Ya he-yum        | Diabetes, wound     | 6 | 3 | 7 |
| Gossia Quadrangularis Linn.      | Ped sang kard               | Constipation, hemorrhoid | 2 | 1 | 4 |
| Curcuma longa Linn               | Turmeric, Ka-mint           | Health tonic, digestive tonic, knee pain | 1,2 | 1 | 4,2 |
| Curcuma xanthorrhiza Roxb.       | Van chak mod look           | Pre-menopause symptom, leucorrhea | 1,2,6 | 1,3 | 1,4,7 |
| Ganoderma lucidum (Curtis) P. Karst | Lingzhi mushroom, Reishi mushroom | Improve brain function | 2 | 1 | 4 |
| Garcinia mangostana L.           | Mangosteen peel             | Health tonic, treat symptom | 5 | 3 | 5 |
| Garcinia gummi-gutta             | Malabar tamarin, Brindle berry, Som kaek | Lower cholesterol | 2 | 1 | 4 |
| Houttuynia cordata Thunb.        | Phu Kaow                   | Health tonic        | 6 | 1 | 7 |
| Moringa oleifera Lam.            | Moringa, Ma-room           | Lower cholesterol   | 2,6 | 1 | 7 |
| Moringa oleifera Lam.            | Moringa, Ma-room           | Lower cholesterol   | 2,6 | 1 | 7 |
| Murdannia laniforis (Hassk.) R.S.Rao & Kammathy | Angel Grass, Ya tewada | Treatment | 6 | 1 | 7 |
| Orthosiphon aristatus Miq        | Ya nuad maw                | Kidney stone, gout  | 6 | 1,3 | 7,2 |
| Phyllanthus emblica Linn, Phyllanthus amarus | Egg Woman, Makam pom | Low back pain, cough, Health tonic, gastritis | 1,5,6 | 1,3 | 4,5,7 |
| Schumach. & Thonn                |                            |                     |     |       |              |
| Senna alexandrina F. Miller      | Alexandria senna, Makam Kaek | Constipation       | 1,4 | 1,3 | 1,2,4 |
| Thunbergia laurifolia Linn.      | Rang joed                  | Lower blood sugar, detoxification | 2,4,6 | 3 | 1,4,7 |
| Tiliacora triandra (Colebr.) Diels | Bai-ya-nang               | Health tonic, Kidney detoxification, | 6 | 1 | 7 |
| Zingiber officinale              | Ginger                     | Cold, Gastrointestinal problems | 6 | 3 | 6 |

**Unspecified herbs**

| Product not identified, mixed in a bottle/package | Form | Usage | How obtained |
|---------------------------------------------------|------|-------|--------------|
| Mixed herb                                         |      | 1,2,4,5,6 | 1,3 |

Notes: *Form:* Pills=1, capsules=2, tablets=3, powder=4, solution=5, crude herbs=6; *Usage:* Swallow=1, Topical use=2, Make into a drink/food using hot water=3, Inhalate=4; *How obtained:* Drug store=1, Folk remedy shop/stand=2, Health food store=3, Hospital=4, Direct sale=5, Provided by their family/friends=6, Own garden=7
Boesenbergia rotunda, Aloe vera,11 hospital patients in Bangkok (Zingiber officinale, Andrographis paniculata, Curcuma longa, Centella asiatica).5 Some of the herbal medicines used in this study are included in the national list of essential medicines in Thailand:35 Aloe vera (L.) Burm.f. (indication: burns), Andrographis paniculata (Burm. f.) Wall. ex Nees (diarrhea), Centella asiatica (L.) Urb. (wound healing) Curcuma longa L. (gastrointestinal symptoms), Garcinia mangostana L. (wounds), Murraya loriiformis (Hassk.) R.S. Rao & Kammathy (fever), Orthosiphon aristatus (Blume) Miq. (diuretic), Senna alexandrina Mill. (constipation), (Thunbergia laurifolia Lindl.) (fever), and Zingiber officinale Rosc. (prevent nausea and vomiting).35 Boesenbergia rotunda (L) Mansf. has anti-ulcerogenic and antioxidant effects.36 According to 2012 statistics on herbal drug use at state hospitals nationwide in Thailand was 1.82% of the total drug spending.

The top three herbal drugs commonly used by the people were curcuma or turmeric drug for the relief of flatulence or upset stomach; phlai or plai drug for muscle pain, swelling, bruise and sprain; and fa-thalai-jon drug for respiratory tract infection, cold and sore throat.37

Results showed that the two most common sources through which herbal medicines were obtained included own garden and hospitals. Satsue et al.38 found in a study in Thailand that health care provider’s advice on herbal remedies and sourcing herbal medicines from hospitals were major factors contributing to herbal medicine use.

Study limitations
The study was cross-sectional, so causal conclusions can be drawn. Further, the study was conducted in selected geographic locations in Thailand, and findings cannot be generalized to other areas in Thailand. The information assessed was by self-report and may have resulted in under- or over-reporting of herbal medicine use in the past 12 months. Some aspects of importance in herbal medicine utilization, such as patient-provider communication on herbal medicine use, was not assessed, and should be assessed in future studies. The study assessed anxiety and depression using screening questionnaires, which has its limitations in terms of a correct psychiatric diagnosis.

Conclusions
The study found a high prevalence of herbal medicine use among chronic disease patients in Thailand. Several factors (education, rural residence, anxiety, low quality of life and multiple chronic conditions) associated with herbal medicine use were identified. This knowledge will support health care providers and policy makers in decision making on the use of herbal medicine.

Availability of data
The data used for this study cannot be made available in the manuscript or a public repository due to the ethical restriction. However, they can be accessed upon request from the Principal Investigator (Prof. Supa Pengpid) at supaprom@yahoo.com.

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Disclosure
The authors report no conflicts of interest in this work.

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