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Use of and attitudes towards herbal medicine during the COVID-19 pandemic: a cross-sectional study in Vietnam

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ABSTRACT

Introduction: Herbal medicine has a long and rich history of practice in Vietnam. However, research on this topic is limited, especially in relation to the COVID-19 pandemic. This study aimed to explore (1) the prevalence and indication for herbal medicine use, (2) factors associated with herbal medicine use, and (3) people's attitude toward the herbal medicine within the Vietnamese population.

Methods: A cross-sectional online survey was conducted in Vietnamese adults aged 18 years and older, distributed equally across the Northern, Central, and Southern regions of Vietnam, between September and October 2020. Descriptive statistics, chi-square tests, and univariate and multivariate logistic regression analyses were performed to achieve the study objectives.

Results: Nearly half of the respondents reported using herbal medicine for common illnesses during the COVID-19 pandemic. The prevalence was strongly associated with marital status, urbanicity, monthly income, and health status perception. Ginger (*Zingiber officinale* Rosc.), honey (*Mel*), garlic (*Allium sativum* L.), and perilla (*Perilla frutescens* (L.) Britt.) were the most commonly used herbal medicines, mainly for the treatment of sore throat, cough, nasal congestion, and fever. Nearly 70% of the participants believed herbal medicines to be safe, to have less side effects than conventional medicines, and to be effective for minor health conditions.

Conclusion: The use of herbal medicine during the COVID-19 pandemic was a common practice among Vietnamese people. These findings may have implications for future medical research in Vietnam, and for policy-makers and those in the pharmaceutical industry with regard to future regulations and product development.

Keywords: Herbal medicine, Vietnam, COVID-19, common illnesses

1. INTRODUCTION

In various countries, especially Asian countries, including Vietnam, Thailand, India, and China, herbal medicine (HM), also known as folk medicine, has been utilized for an extensive period of time [1–3]. Due to the benefits of being financially affordable, having minimal side effects, being from natural origins, and having a reported high efficacy from the experiences of previous users, approximately 80% of the populations of developing countries practice HM in the primary healthcare setting, mainly for the treatment of chronic diseases [4,5]. Additionally, the use of traditional medicine has spread internationally to developed countries [6]. For instance, physicians in Europe and North America have started to refer their patients for acupuncture (43%), massage (21%), and chiropractic (40%) [7]. Similarly, in Japan, 80% of medical practitioners recommended HM for their patients in 2005 [8]. Moreover, HM has been covered in medical teaching and training through numerous medical courses for doctors, pharmacists, nurses, and other medical staff [7–9]. As such, the use of HM has been rapidly increasing and it is necessary to investigate peoples' perspectives on the topic.

In Vietnam, HM has a long and rich history of practice. For thousands of years, Vietnamese people have utilized medicinal plants collected from their gardens to treat various diseases. Documented data from as early as the 17th century, showed that two books, Nam Duoc Than Hieu (The Miraculous Efficacy of Vietnamese Medicines) and Hong Nghia Giac Tu Thu (Medical book from village Hong Nghia), authored by Tue Tinh, described 630 natural drugs in 3,873 preparations with a detailed theoretical explanation of traditional medicine [10]. To date, we have identified at least 1,863 plant species in 238 families and nearly 8,000 specimens of 1,296 species of plant, and approximately 1,000 different folk remedy preparations [11]. In Vietnamese clinics and hospitals, HM has been utilized extensively, together with modern medicine. More than 700 officially registered medical preparations contain HM ingredients. In fact, almost every hospital contains a traditional medicine department, which is officially at the same administrative level as departments practicing modern medicine such as internal medicine. Thus, HM is a crucial part of the Vietnamese healthcare system, in which the treatment rates are expected to reach 30% of all treatments administered and prescribed at general healthcare facilities by 2025. Nevertheless, in-depth investigations with regards to the knowledge, attitudes, and practices among the Vietnamese people about HM usage are lacking, especially in relation to COVID-19.

The COVID-19 pandemic has affected several aspects of human life, including HM use and the perspectives of Vietnamese people regarding these medicines. Since the development

of new drugs require several trials and lengthy regulatory processes, HM has an important role in overcoming this outbreak. HM has been claimed not only to enhance the immune system against the coronavirus [12], but also to effectively prevent and treat SARS-related diseases [13–15], as well as relieve cold- and flu-like symptoms such as fever, cough, fatigue, sneezing, sore throat, and muscle pain. Moreover, HM can be used in a manner complementary to modern medicine for synergistic effects on SARS-related diseases [16]. Therefore, the Vietnam Ministry of Health has facilitated the use of HM for the prevention and complementary treatment of COVID-19. Moreover, due to the concern of becoming infected with COVID-19 while in crowded places such as hospitals, Vietnamese people are tending to prefer remedies more readily available in the home, including HM. Additionally, the symptoms of COVID-19 are similar to those of the common flu and cold, consequently making people more aware of these symptoms, and likely to want to treat them early rather than waiting for them to resolve. All these issues may impact the perspectives of Vietnamese patients regarding HM, yet no such investigation has been reported.

The objective of this study was to explore the perspectives of Vietnamese people on the use of HM for treating common diseases, especially flu, cold, and COVID-like diseases, and factors affecting decisions made during the COVID-19 pandemic. To achieve this objective, the investigation comprised a cross-sectional survey conducted in 515 randomized Vietnamese adults using an online questionnaire-based platform. The questionnaire covered factors related to the decision to use HM, the 20 most commonly used HM, and the 12 most commonly reported symptoms, as well as participants' attitudes, sources of information, and methods of procuring HM.

2. METHODS

2.1. Study setting

A cross-sectional study was conducted on adults aged 18 years and older in Vietnam. Participants were recruited through advertisements posted in health-related public Facebook groups. The post included the introduction of HM and its benefits, together with a survey link to a self-administered questionnaire generated using Google Forms. In addition, the survey link was distributed to students and lecturers of some universities in Vietnam. Participants were also asked to share the link using their contacts in Facebook Messenger and Zalo. The social networking platforms Zalo and Facebook were chosen because they are the most

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widely used platforms in Vietnam (comprising 90% of all social network users) [17]. The survey was available for 8 weeks from September to October 2020.

To determine the minimum required sample size, the Cochran formula was used with a precision of 5%, a confidence level of 95% (corresponding to a Z-score of 1.96), and a maximum variable heterogeneity (p = 0.5, representing a 50/50 split of HM users and non-users). Using the Cochran formula (Eq. 1), the minimum sample size for our study was found to be 385. To maximize the generalizability of the findings, a sample of approximately 500 subjects was the target.

$$N = Z^2 p(1 - p)/e^2 \qquad \text{(Eq. 1)}$$

Where n = the required minimum sample size

Z = Z-score

p = estimated proportion of HM users in the population; maximum heterogeneity at 0.5

e = level of precision (margin of error)

2.2. Questionnaire design

The self-administered questionnaire comprised three sections. The first section assessed factors related to the participant's socio-demographic background and health. Socioeconomic factors included gender (female, male), age (years), marital status (single, divorced, widowed, married), region (Northern, Central, Southern), education (secondary school, high school, colleges, vocational schools, undergraduate, postgraduate), urbanicity (rural, suburban, urban), occupation (unemployed, retired, housewife, student, working), and monthly income (VND million). Health-related variables investigated whether participants were in a healthcare-related job, had any chronic disease, and their perception of their health status. The healthcare related job and chronic disease were closed questions, with two answer options (Yes, No), health status perception was measured by a 5-point Likert scale (very poor, poor, fair, good, very good).

The second section contained questions about the information sources accessed by participants, the types of HM that they have utilized, and the corresponding health conditions they intended to treat. HM use was identified using the question: "During the COVID-19 pandemic, do you use herbs or herbal products for common illnesses?" Respondents who acknowledged using HM were asked further questions exploring their motivation for doing so (i.e., "for what common health problems, symptoms, or conditions did you use herbs or herbal products during the period of the pandemic?"), the HM used, where it was procured from, and their reasons for using HM based on ten statements. For those respondents who had

not used HM during the COVID-19 pandemic, the survey explored their reasons for this, also based on ten statements.

In the final section of the survey, participants were asked about their attitudes towards the safety of HM, its efficacy, side effects, use to treat either minor or major health conditions, and their satisfaction with HM [18–21]. Each item was evaluated using a five-point Likert scale using the response options (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree.

2.3. Ethical considerations

This study was conducted following the guidelines outlined in the Declaration of Helsinki. Ethical approval for the study was obtained from the Medical Ethics Council of Can Tho University of Medicine and Pharmacy, Can Tho city, Vietnam (approval number 245/HDDD-PCT). The participant recruitment process was based solely on the principles of volunteering and anonymity, and no personal data were collected at any point.

2.4. Statistical analysis

Responses taking the format of five-point Likert scales were pre-processed for analysis. Respondents selecting 'strongly disagree' and 'disagree' were combined and interpreted as 'disagree', and similarly, respondents selecting 'agree' and 'strongly agree' were combined and interpreted as 'agree'.

All data were analyzed using SPSS version 20.0. Descriptive statistics were expressed as frequency (n) and percentage (%), and mean and standard deviation (SD). Unadjusted and adjusted regression analyses were conducted to determine the factors associated with HM use. Variables with p values of less than 0.25 obtained from the unadjusted regression analysis were subsequently included in the adjusted analysis. Each factor was presented using the odds ratio (OR) with 95% confidence intervals (CI). Chi-square tests were used to assess associations between attitudes towards HM and HM use. Statistical significance was considered at a threshold of $p < 0.05$.

3. RESULTS

3.1. Socio-demographic and health-related characteristics

Out of the 515 responses received, 7 gave incomplete responses and were therefore excluded from the analysis. The final sample comprised the responses of 508 participants. The socio-demographic and health-related characteristics of the respondents have been summarized in Table 1. Participant ages ranged from 18 to 68 years (mean age = 26.8 ± 7.6 years). The majority of participants were female (64.6%), were educated to undergraduate

level (51.8%), lived in suburban areas (53.7%), and were in employment (47.8%) with a monthly income of more than VND 8.4 million (49.6%; approximately equivalent to $365 USD). Most participants (95%) reported that they did not have a chronic illness and considered themselves to be in good health (50.6%).

3.2. Prevalence and indications for herbal medicine use

During the period of the COVID-19 pandemic, 249 (49%) out of 508 participants considered using HM to treat the symptoms of common illnesses. The most frequently used HM were ginger (79.1%; *Zingiber officinale* Rosc.), followed by honey (74.7%; *Mel*), garlic (64.7%; *Allium sativum* L.), and perilla (48.2%; *Perilla frutescens* (L.) Britt.). These herbs were mainly used for the treatment of sore throat (62.2%), cough (60.6%), nasal congestion (41.4%), and fever (35.7%). Information on the types of HM used and their indications are given in Figures 1 and 2.

Table 2 describes respondents' responses regarding the source of information they sought out related to HM use, HM supply, and reasons for using and not using HM. Oriental medical doctors (81.4%), herbalists (47.6%), herbal medicine manufacturers (41.3%), and pharmacists (39.4%) were the main sources cited by participants for HM information. The majority of participants obtained HM from their garden (i.e., they grew it themselves), followed by markets and herbal drugstores (62.7, 43.4%, and 41.0%, respectively). In terms of the reason for using HM, participants most commonly cited 'previous personal experience' (62.2%), the 'natural' origins of HM (59.8%), 'ease of access and availability of herbal remedies' (49.0%), and 'advice of family, friends' (43.0%). Conversely, the most common reasons for not using HM among those who had not used it in the specified period included 'do not have enough experience, knowledge' (44.8%), 'longer time to see effect' (41.7%), 'I am healthy and no need for its use' (35.5%), and 'lack of experts consultation on usage' (29.3%).

3.3. Factors associated with herbal medicine utilization

Unadjusted and adjusted regression analyses showed that marital status, urbanicity, monthly income, and participants' perception of their own health status were significantly associated with HM use (Table 1). Married participants were 1.8 times more likely to use HM than other groups (adjusted odds ratio (aOR): 1.78, 95%CI: 1.07-2.94). Rural residents were more likely to use HM than those living in an urban environment (aOR: 1.67, 95%CI: 1.12-2.47). Respondents who had an average monthly income of more than VND 8.4 million were 1.7 times more likely to use HM than those with incomes of less than VND 4.2 million (aOR: 1.72, 95%CI: 1.04-2.83). Participants who had the perception of their health status as being

'very good' were more likely to use HM than those responding 'fair' (aOR: 2.8, 95%CI: 1.04-7.56).

3.4. Respondents' attitudes regarding herbal medicine

Attitudes towards HM (Table 3) revealed that the majority of respondents agreed with four statements, reflecting a broadly positive attitude. Nearly 70% of the participants believed HM to be safe, have less side effects than conventional drugs, and to be effective for treating minor health conditions. Additionally, more than 65% of the respondents were satisfied with the outcomes they had experienced using HM. Significant associations ($p \leq 0.05$) were found between respondents' attitudes towards HM and HM use. Participants who had a positive attitude to HM (i.e., agreed with the majority of the statements) were more likely to use them. Specifically, participants who responded that they believed that 'herbal medicines are natural and therefore are safe' were more likely to use HM (55.1%) than those who responded negatively to this item.

4. DISCUSSION

This study investigated the perspectives of Vietnamese adults on the use of HM for treating common diseases during the COVID-19 pandemic. Amongst a sample of 508 respondents, distributed all over the country (i.e., Northern, Central, and Southern regions of Vietnam), nearly a half (49%) reported that they had used HM. This number was significantly higher than that reported in other Southeast Asian countries also having a long history of HM use such as Malaysia (33.9%) [22], Bangkok-Thailand (28.6%) [23], Thailand (within a sample of those living with chronic disease, 35.9%) [24], Indonesia (24.4%) [25], and Singapore (again, among those living with chronic disease, 22.7%) [26]. Similarly, the prevalence of HM in Taiwan and Korea was 6.8% and 61.1%, respectively [27,28]. Interestingly, a study conducted in China, commonly acknowledged as the cradle of HM, reported a lower percentage of HM use in some areas such as the Urban Pearl River Delta region (37%) [29]. Conversely, studies conducted in Africa and countries in West Asia have reported much higher HM use, with prevalence rates of 85% reported in Nigeria and 80.2% in Jordan [30,31]. The variability in prevalence between these studies could be attributed to the study design, sample population, sample size, and socio-demographic characteristics; as well as the impact of the COVID-19 pandemic on the cohort recruited in the present study. As far as we are aware, limited studies on the use of HM have been conducted during or since the COVID-19 pandemic. Further, for patients living with chronic diseases, HM use was

found to be only 23.9% in Vietnam in 2016 (i.e., before the COVID-19 pandemic) [32]. Therefore, it may be concluded that the COVID-19 pandemic has motivated Vietnamese people to use HM for the treatment of common diseases, thereby preventing the necessity to travel to crowded places such as hospitals to attend appointments in centers of conventional medicine.

Considering the socio-demographic factors and their relation to HM use, participants living in rural areas were more likely to use HM than other groups, possibly due to the availability and ease of access of HM compared to conventional medicines in these areas compared to urban areas [33]. Similarly, the majority of participants obtained HM from a home garden and the surrounding environment rather than a drug store or hospital (Table 2). A study in the Philippines reported a similar trend [34]. Moreover, respondents reporting their self-perceived health status to be 'very good' were more likely to use HM than those responding 'fair'. This result was not consistent with other studies, which stated either no significant impact of self-perceived health [35] or reported individuals with lower self-perceived health to be more likely to consume HM [36]. There may be undetected differences in the purpose of the HM use, with Vietnamese people tending to use HM for common colds and flu symptoms, rather than chronic diseases. Healthy people tend to recover from these minor illnesses effortlessly with a little help from HM, whereas people who perceive their health to be compromised may find the same symptoms more difficult to tolerate or recover from, and consequently may benefit more from the use of conventional modern medicine. Surprisingly, respondents with higher monthly incomes tended to be more likely to use HM than those with lower incomes, similar to other work [33], which is in contradiction to the assumption that wealthy people will be more inclined to prefer modern medicine to HM. These findings were not in line with other studies, where those in low- or middle-income groups were found to be more likely to use HM than those in high income groups [30,37,38]. Therefore, there may be an interaction between socio-demographic characteristics and other factors associated with HM use. Further studies are necessary to fully explore the relationship between wealth and HM use.

Unsurprisingly, Vietnamese people typically reported using HM to treat sore throat, cough, nasal congestion, and fever, which are the common symptoms of COVID-19. Similar findings have been reported in previous studies [39,40]. The most frequently used HM have previously been reported to be ginger (*Zingiber officinale* Rosc.), honey (*Mel*), garlic (*Allium sativum* L.), and perilla (*Perilla frutescens* (L.) Britt.). These are all popular herbs that can be found in almost everywhere in the Vietnam rural and suburban areas, and are widely reported

to be effective. Moreover, these HM were listed in the Essential Drug List, issued by the Vietnam Ministry of Health. Thus, medical practitioners are able to legally prescribe these HM for patient use. Since the effectiveness of HM is under debate, many Vietnamese people use them based on direct experience, either first or second hand. The results supported this hypothesis, with the most commonly cited sources of information on HM being oriental medical doctors (81.4%); and personal experience was cited as the primary reason for deciding to use HM (i.e., one might use or not use HM based solely on experience; Table 2). This finding was in agreement with that of a previous study [31]. In terms of respondent attitudes towards HM, respondents were generally satisfied with the effectiveness of HM for treating minor health conditions such as common colds and flu, as most participants reported HM to be safe and effective.

LIMITATIONS

Although the results of the present study having been obtained using a simple yet effective online survey administered during the COVID-19 pandemic, this study has some limitations which could be overcome in future investigations. Firstly, the platform of an online survey was used to obtain the largest possible number of participants in a short period of time. However, it is acknowledged that this may bias recruitment to younger individuals. The convenience and simplicity of an online format can increase participant compliance in older individuals. Secondly, compared to data acquired in an interview-based setting, a self-administered questionnaire may bias some of the data captured, as it is possible that respondents might have over or underreported their HM usage. Nevertheless, in the context of the COVID-19 pandemic, online-based and self-administered platforms are necessary, and facilitate data collection that would otherwise not be possible due to social distancing and restrictions on movement. Thirdly, although the sample was spread equally across the three main regions of Vietnam, ethnic minorities were not considered in this study, and as such there is no way of establishing whether the sample contained an over- or underrepresentation of certain ethnic groups and thus potentially an over- or underestimation of HM use within the sample.

CONCLUSIONS

The use of herbal medicine during the COVID-19 pandemic was commonplace among Vietnamese people (49% of the sample) and was found to be associated with marital status, urbanicity, monthly income, and self-perception of health status. Ginger, honey, garlic,

and perilla were the most commonly used herbs, mainly for the treatments of COVID-19-like symptoms such as sore throat, cough, and fever. The sample reported obtaining information on HM from oriental medical doctors, herbalists, and pharmacists. Therefore, healthcare professionals should be open to discuss and offer advice for the use of HM if it is thought to lead to better health outcomes. The findings of this study are of relevance to future research on the use of medicines in Vietnam and for policy-makers and manufacturers involved in making decisions on developments in the field of herbal medicine.

AUTHORS' CONTRIBUTION

Conceptualization: P.H.N., V.D.T., D.T.P.; methodology: V.D.T., T.N.P.D., validation: P.H.N., D.T.P., investigation: P.H.N., V.D.T., T.N.P.D., resource: D.T.P., writing-original draft: P.H.N., V.D.T., T.N.P.D., D.T.P., writing-review and editing: V.D.T., D.T.P., R.S.D., supervision: D.T.P.

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DECLARATION OF COMPETING INTERESTS

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author Duy Toan Pham (i.e. upon reasonable request).

REFERENCES

[1] O. Akerele, WHO's traditional medicine programme: progress and perspectives., WHO Chron. 38 (1984) 76–81.

[2] J. WHO Centre for Health Development (Kobe, Proceedings : International Meeting

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on Global Atlas of Traditional Medicine, 17-19 June 2003, Kobe, Japan, (n.d.).
https://apps.who.int/iris/handle/10665/68750.

[3] U. Payyappallimana, Role of Traditional Medicine in Primary Health Care : An
Overview of Perspectives and Challenging, in: 2010.

[4] W.M. Bandaranayake, Quality Control, Screening, Toxicity, and Regulation of Herbal
Drugs, Mod. Phytomedicine. (2006) 25–57.
https://doi.org/https://doi.org/10.1002/9783527609987.ch2.

[5] S. Wachtel-Galor, I.F.F. Benzie, Herbal Medicine: An Introduction to Its History,
Usage, Regulation, Current Trends, and Research Needs., in: I.F.F. Benzie, S.
Wachtel-Galor (Eds.), Boca Raton (FL), 2011.

[6] D.D. Pham, J.H. Yoo, B.Q. Tran, T.T. Ta, Complementary and Alternative Medicine
Use among Physicians in Oriental Medicine Hospitals in Vietnam: A Hospital-Based
Survey, Evidence-Based Complement. Altern. Med. 2013 (2013) 392191.
https://doi.org/10.1155/2013/392191.

[7] J.A. Astin, A. Marie, K.R. Pelletier, E. Hansen, W.L. Haskell, A review of the
incorporation of complementary and alternative medicine by mainstream physicians.,
Arch. Intern. Med. 158 (1998) 2303–2310.
https://doi.org/10.1001/archinte.158.21.2303.

[8] K. Fujiwara, J. Imanishi, S. Watanabe, K. Ozasa, K. Sakurada, Changes in Attitudes of
Japanese Doctors toward Complementary and Alternative Medicine—Comparison of
Surveys in 1999 and 2005 in Kyoto, Evidence-Based Complement. Altern. Med. 2011
(2011) 608921. https://doi.org/10.1093/ecam/nep040.

[9] S.-I. Lee, Y.-H. Khang, M.-S. Lee, W. Kang, Knowledge of, attitudes toward, and
experience of complementary and alternative medicine in Western medicine- and
oriental medicine-trained physicians in Korea., Am. J. Public Health. 92 (2002) 1994–
2000. https://doi.org/10.2105/ajph.92.12.1994.

[10] kDôTâtLi, Nguyên Xuân Duñg, Native drugs of Vietnam: which traditional and
scientific approaches?, J. Ethnopharmacol. 32 (1991) 51–56.
https://doi.org/https://doi.org/10.1016/0378-8741(91)90103-K.

[11] W.H.O.R.O. for the Western Pacific, Medicinal plants in Viet Nam, Manila : WHO
Regional Office for the Western Pacific, 1990.

[12] K. Khanna, S.K. Kohli, R. Kaur, A. Bhardwaj, V. Bhardwaj, P. Ohri, A. Sharma, A.
Ahmad, R. Bhardwaj, P. Ahmad, Herbal immune-boosters: Substantial warriors of
pandemic Covid-19 battle., Phytomedicine. (2020).

https://doi.org/10.1016/j.phymed.2020.153361.

[13]   on the Treatment of SARS by Traditional Chinese Medicine, C. the Integration of Traditional Chinese Medicine with Western Medicine (2003 : Beijing, SARS : clinical trials on treatment using a combination of traditional Chinese medicine and Western medicine : report of the WHO International Expert Meeting to review and analyse clinical reports on combination treatment for SARS, 8-10 October 2003, Beij, (2004) 196 p.

[14]   Y. Yang, M.S. Islam, J. Wang, Y. Li, X. Chen, Traditional Chinese Medicine in the Treatment of Patients Infected with 2019-New Coronavirus (SARS-CoV-2): A Review and Perspective., Int. J. Biol. Sci. 16 (2020) 1708–1717. https://doi.org/10.7150/ijbs.45538.

[15]   H. Luo, Q.-L. Tang, Y.-X. Shang, S.-B. Liang, M. Yang, N. Robinson, J.-P. Liu, Can Chinese Medicine Be Used for Prevention of Corona Virus Disease 2019 (COVID-19)? A Review of Historical Classics, Research Evidence and Current Prevention Programs., Chin. J. Integr. Med. 26 (2020) 243–250. https://doi.org/10.1007/s11655-020-3192-6.

[16]   X. Liu, M. Zhang, L. He, Y.P. Li, Y.K. Kang, Chinese herbs combined with Western medicine for severe acute respiratory syndrome (SARS)., Cochrane Database Syst. Rev. (2006) CD004882. https://doi.org/10.1002/14651858.CD004882.pub2.

[17]   Statista Research Department, Leading social media platforms in Vietnam in 2019, (2020).

[18]   A.N. Welz, A. Emberger-Klein, K. Menrad, The importance of herbal medicine use in the German health-care system: Prevalence, usage pattern, and influencing factors, BMC Health Serv. Res. 19 (2019) 952. https://doi.org/10.1186/s12913-019-4739-0.

[19]   C.S. Nworu, P.O. Udeogaranya, C.K. Okafor, A.O. Adikwu, P.A. Akah, Perception, usage and knowledge of herbal medicines by students and academic staff of University of Nigeria: A survey, Eur. J. Integr. Med. 7 (2015) 218–227. https://doi.org/10.1016/j.eujim.2015.01.005.

[20]   R. Lazarou, M. Heinrich, Herbal medicine: Who cares? The changing views on medicinal plants and their roles in British lifestyle, Phyther. Res. 33 (2019) 2409–2420. https://doi.org/10.1002/ptr.6431.

[21]   T.A.S.T. Mohamad, F. Islahudin, M. Jasamai, J.A. Jamal, Preference, perception and predictors of herbal medicine use among malay women in Malaysia, Patient Prefer. Adherence. 13 (2019) 1829–1837. https://doi.org/10.2147/PPA.S227780.

[22] Z. Aziz, N.P. Tey, Herbal medicines: prevalence and predictors of use among Malaysian adults., Complement. Ther. Med. 17 (2009) 44–50. https://doi.org/10.1016/j.ctim.2008.04.008.

[23] N. Satyapan, S. Patarakitvanit, S. Temboonkiet, T. Vudhironarit, J. Tankanitlert, Herbal medicine: affecting factors and prevalence of use among Thai population in Bangkok., J. Med. Assoc. Thai. 93 Suppl 6 (2010) S139-44.

[24] K. Peltzer, S. Pengpid, The use of herbal medicines among chronic disease patients in Thailand: a cross-sectional survey., J. Multidiscip. Healthc. 12 (2019) 573–582. https://doi.org/10.2147/JMDH.S212953.

[25] S. Pengpid, K. Peltzer, Utilization of traditional and complementary medicine in Indonesia: Results of a national survey in 2014-15., Complement. Ther. Clin. Pract. 33 (2018) 156–163. https://doi.org/10.1016/j.ctcp.2018.10.006.

[26] G.B.W. Lee, T.C. Charn, Z.H. Chew, T.P. Ng, Complementary and alternative medicine use in patients with chronic diseases in primary care is associated with perceived quality of care and cultural beliefs., Fam. Pract. 21 (2004) 654–660. https://doi.org/10.1093/fampra/cmh613.

[27] C.-C. Shih, L.-H. Huang, H.-L. Lane, C.-C. Tsai, J.-G. Lin, T.-L. Chen, C.-C. Yeh, C.-C. Liao, Use of Folk Therapy in Taiwan: A Nationwide Cross-Sectional Survey of Prevalence and Associated Factors, Evidence-Based Complement. Altern. Med. 2015 (2015) 649265. https://doi.org/10.1155/2015/649265.

[28] S. Jang, K.H. Kim, S.-H. Sun, H.-Y. Go, E.-K. Lee, B.-H. Jang, Y.-C. Shin, S.-G. Ko, Characteristics of Herbal Medicine Users and Adverse Events Experienced in South Korea: A Survey Study, Evidence-Based Complement. Altern. Med. 2017 (2017) 4089019. https://doi.org/10.1155/2017/4089019.

[29] V.C.H. Chung, S.Y.S. Wong, H.H.X. Wang, M.C.S. Wong, X. Wei, J. Wang, S. Liu, R.S.T. Ho, E.L.M. Yu, S.M. Griffiths, Use of Traditional and Complementary Medicine as Self-Care Strategies in Community Health Centers: Cross-Sectional Study in Urban Pearl River Delta Region of China, Medicine (Baltimore). 95 (2016). https://journals.lww.com/md-journal/Fulltext/2016/06070/Use_of_Traditional_and_Complementary_Medicine_as.12.aspx.

[30] O. Aina, L. Gautam, P. Simkhada, S. Hall, Prevalence, determinants and knowledge about herbal medicine and non-hospital utilisation in southwest Nigeria: a cross-sectional study, BMJ Open. 10 (2020). https://doi.org/10.1136/bmjopen-2020-040769.

[31]   F. El-Dahiyat, M. Rashrash, S. Abuhamdah, R. Abu Farha, Z.-U.-D. Babar, Herbal medicines: a cross-sectional study to evaluate the prevalence and predictors of use among Jordanian adults, J. Pharm. Policy Pract. 13 (2020) 2. https://doi.org/10.1186/s40545-019-0200-3.

[32]   K. Peltzer, S. Pengpid, A. Puckpinyo, S. Yi, L.V. Anh, The utilization of traditional, complementary and alternative medicine for non-communicable diseases and mental disorders in health care patients in Cambodia, Thailand and Vietnam., BMC Complement. Altern. Med. 16 (2016) 92. https://doi.org/10.1186/s12906-016-1078-0.

[33]   R.S. Thorsen, M. Pouliot, Traditional medicine for the rich and knowledgeable: challenging assumptions about treatment-seeking behaviour in rural and peri-urban Nepal, Health Policy Plan. 31 (2016) 314–324. https://doi.org/10.1093/heapol/czv060.

[34]   H.A.L. Catublas, Knowledge , attitudes and practices in the use of herbal medicine : the case of urban and rural mothers in the philippines, in: 2016.

[35]   M. Rashrash, J.C. Schommer, L.M. Brown, Prevalence and Predictors of Herbal Medicine Use Among Adults in the United States, J. Patient Exp. 4 (2017) 108–113. https://doi.org/10.1177/2374373517706612.

[36]   P.S. Adusumilli, L. Ben-Porat, M. Pereira, D. Roesler, I.M. Leitman, The prevalence and predictors of herbal medicine use in surgical patients., J. Am. Coll. Surg. 198 (2004) 583–590. https://doi.org/10.1016/j.jamcollsurg.2003.11.019.

[37]   P. Gardiner, R. Graham, A.T.R. Legedza, A.C. Ahn, D.M. Eisenberg, R.S. Phillips, Factors associated with herbal therapy use by adults in the United States., Altern. Ther. Health Med. 13 (2007) 22–29.

[38]   P.M. Barnes, B. Bloom, R.L. Nahin, Complementary and alternative medicine use among adults and children: United States, 2007., Natl. Health Stat. Report. (2008) 1–23.

[39]   R.W. Bussmann, D. Sharon, A. Lopez, Blending Traditional and Western Medicine: Medicinal plant use among patients at Clinica Anticona in El Porvenir, Peru, Ethnobot. Res. Appl. Vol 5. (2007). http://ethnobotanyjournal.org/era/index.php/era/article/view/129.

[40]   D. Picking, N. Younger, S. Mitchell, R. Delgoda, The prevalence of herbal medicine home use and concomitant use with pharmaceutical medicines in Jamaica., J. Ethnopharmacol. 137 (2011) 305–311. https://doi.org/10.1016/j.jep.2011.05.025.

Table 1. Socio-demographic characteristics and factors associated with herbal medicine (HM) uses among respondents (n = 508)

Variable		Total	HM user	HM non-user	Unadjusted		Adjusted	
		n (%)	n (%)	n (%)	OR (95% CI)	p-value	aOR (95% CI)	p-value
Gender	Female	328 (64.6)	162 (49.4)	166 (50.6)	1			
	Male	180 (35.4)	87 (48.3)	93 (51.7)	0.959 (0.666-1.379)	0.820	-	-
Age group, years	18 – 29	369 (72.6)	172 (46.6)	197 (53.4)	1		1	
	30 – 39	104 (20.5)	62 (59.6)	42 (40.4)	1.691 (1.087-2.630)	**0.020**	1.26 (0.73-2.15)	0.407
	40+	35 (6.9)	15 (42.9)	20 (57.1)	0.859 (0.427-1.730)	0.670	0.59 (0.26-1.34)	0.205
Marital status	Single/Divorced/Widowed	354 (69.7)	158 (44.6)	196 (55.4)	1		1	
	Married	154 (30.3)	91 (59.1)	63 (40.9)	1.792 (1.221 - 2.629)	**0.003**	1.78 (1.07-2.94)	**0.026**
Region	North	121 (23.8)	60 (49.6)	61 (50.4)	1			
	Central	155 (30.5)	67 (43.2)	88 (56.8)	0.774 (0.480 - 1.248)	0.293		
	South	232 (45.7)	122 (52.6)	110 (47.4)	1.128 (0.726 - 1.75	0.593	-	-
Education	High school or lower	65 (12.8)	32 (49.2)	33 (50.8)	1			
	Colleges/Vocational schools	110 (21.7)	50 (45.5)	60 (54.5)	0.859 (0.465 - 1.588)	0.629		
	Undergraduate	263 (51.8)	131 (49.8)	132 (50.2)	1.023 (0.595 - 1.762)	0.933		
	Postgraduate	70 (13.8)	36 (51.4)	34 (48.6)	1.092 (0.556 - 2.145	0.799	-	-
Urbanicity	Rural	48 (9.45)	122 (55)	100 (45)	1.469 (1.017-2.121)	**0.040**	1.67 (1.12-2.47)	**0.011**
	Suburban	222 (53.7)	19 (39.6)	29 (60.4)	0.789 (0.419-1.484)	0.462	0.79 (0.41-1.53)	0.478
	Urban	238 (46.9)	108 (45.4)	130 (54.6)	1		1	
Occupation category	Unemployed/Retired/Housewife	50 (9.8)	23 (46)	27 (54)	1			
		215 (42.3)	95 (44.2)	120 (55.8)	0.929 (0.501 - 1.724)	0.816	-	-

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	Student	243 (47.8)	131 (53.9)	112 (46.1)	1.373 (0.746 - 2.529)	0.309		
	Working							
Monthly income, VND million	<4.2	100 (19.7)	40 (40)	60 (60)	1		1	
	4.2 – 8.3	148 (29.1)	66 (44.6)	82 (55.4)	1.207 (0.721-2.020)	0.473	1.07 (0.63-1.82)	0.806
	8.4+	252 (49.6)	140 (55.6)	112 (44.4)	1.875 (1.171-3.003)	**0.009**	1.72 (1.04-2.83)	**0.033**
Healthcare related job	No	265 (52.2)	121 (45.7)	144 (54.3)	1		1	
	Yes	243 (47.8)	128 (52.7)	115 (47.3)	1.325 (0.934 - 1.878)	0.114	1.25 (0.86-1.82)	0.235
Health status perception*	Poor	22 (4.3)	8 (36.4)	14 (63.6)	1		1	
	Fair	69 (13.6)	32 (46.4)	37 (53.6)	1.51 (0.56 - 4.07)	0.412	2.42 (0.83-7.03)	0.104
	Good	257 (50.6)	126 (49)	131 (51)	1.68 (0.68 - 4.15)	0.258	2.63 (0.99-6.98)	0.052
	Very good	160 (31.5)	83 (51.9)	77 (48.1)	1.886 (0.750 - 4.745)	0.177	2.8 (1.04-7.56)	**0.042**
Chronic disease	No	482 (94.9)	236 (49)	246 (51)	1			
	Yes	25 (4.9)	13 (52)	12 (48)	1.129 (0.505 - 2.525)	0.767	-	-

* Self-perceived health status (very poor, poor, fair, good, very good). Note: No respondent selected "very poor" health perception.

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Table 2. Characteristics of herbal medicine uses among respondents

Variables	Frequency, n (%)
Herbal medicine use during COVID-19 (n = 508)	
Yes	249 (49.0)
No	259 (51.0)
Information sources about herbal medicine (n = 508)	
Oriental medical doctors*	424 (81.4)
Medical doctors	109 (21.5)
Pharmacists	200 (39.4)
Herbalists	242 (47.6)
Nutritionists	117 (23)
Family and friends	81 (16.9)
Media and Information channels	153 (30.1)
Herbal medicine manufacturers	210 (41.3)
Herbal drugstores	171 (33.7)
Obtaining herbal medicines (n = 249)	
Traditional hospitals	69 (27.7)
Herbal drugstores	102 (41.0)
Drugstores	66 (26.5)
Availability at home gardens	156 (62.7)
Internet	22 (8.8)
Markets, supermarkets	108 (43.4)
Family, friends	75 (30.1)
Reasons for herbal medicine use among users (n = 249)	
Healthcare providers' recommendation	49 (19.7)
Advice of family, friends	107 (43)
Influence from social media, internet	40 (16.1)
Previous personal experience	155 (62.2)
Low cost of herbal remedy	21 (8.4)
Easy access and availability of herbal remedy	122 (49)
Natural	149 (59.8)
Health facility is too far	6 (2.4)
Side effects of conventional medicines	45 (18.1)

|	
Lack of trust in modern medicine	7 (2.8)
Reason for not using herbal medicines among non-users (n = 259)	
Longer time to see effect	108 (41.7)
Do not have enough experience, knowledge	116 (44.8)
Not safe	14 (5.4)
Not effective	9 (3.5)
Not easy to access, lack of availability	53 (20.5)
Insufficient scientific evidence on their use	46 (17.8)
Lack of experts consultation on usage	76 (29.3)
Bad taste	61 (23.6)
I am healthy and no need for its use	92 (35.5)
Prefer using conventional medications	23 (8.9)

*: graduated 6-year program in traditional medical education.

Table 3. Respondents' attitudes towards herbal medicines (HM) and association between their attitudes and HM use (Chi-square test)

Statement	Mean (SD)	Total n (%)	HM uses n (%)	χ^2 (df)
HM are natural and therefore are safe	3.94 (0.99)			18.54 (2)***
Disagree[a]		43 (8.5)	18 (41.9)	
Neutral		109 (21.5)	35 (32.1)	
Agree[b]		356 (70.1)	196 (55.1)	
HM work better than conventional drugs	3.09 (1.06)			9.00 (2)*
Disagree[a]		145 (28.5)	70 (48.3)	
Neutral		213 (41.9)	91 (42.7)	
Agree[b]		150 (29.5)	88 (58.7)	
HM have less side effects than conventional drugs	3.90 (1.05)			19.13 (2)***
Disagree[a]		60 (11.8)	23 (38.3)	
Neutral		89 (17.5)	28 (31.5)	
Agree[b]		359 (70.7)	198 (55.2)	
HM are effective for minor health condition	3.90 (1.02)			8.80 (2)*
Disagree[a]		49 (9.6)	21 (42.9)	
Neutral		104 (20.5)	39 (37.5)	
Agree[b]		355 (69.9)	189 (53.2)	
HM are effective for major health condition	3.17 (1.14)			10.67 (2)**
Disagree[a]		126 (24.8)	58 (46)	
Neutral		189 (37.2)	79 (41.8)	
Agree[b]		193 (38.0)	112 (58)	
I am satisfied with the outcomes of using HM	3.80 (0.92)			28.92 (2)***
Disagree[a]		41 (8.1)	20 (48.8)	
Neutral		133 (26.2)	39 (29.3)	
Agree[b]		334 (65.7)	190 (56.9)	

[a] strongly disagree and disagree, [b] strongly agree and agree

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
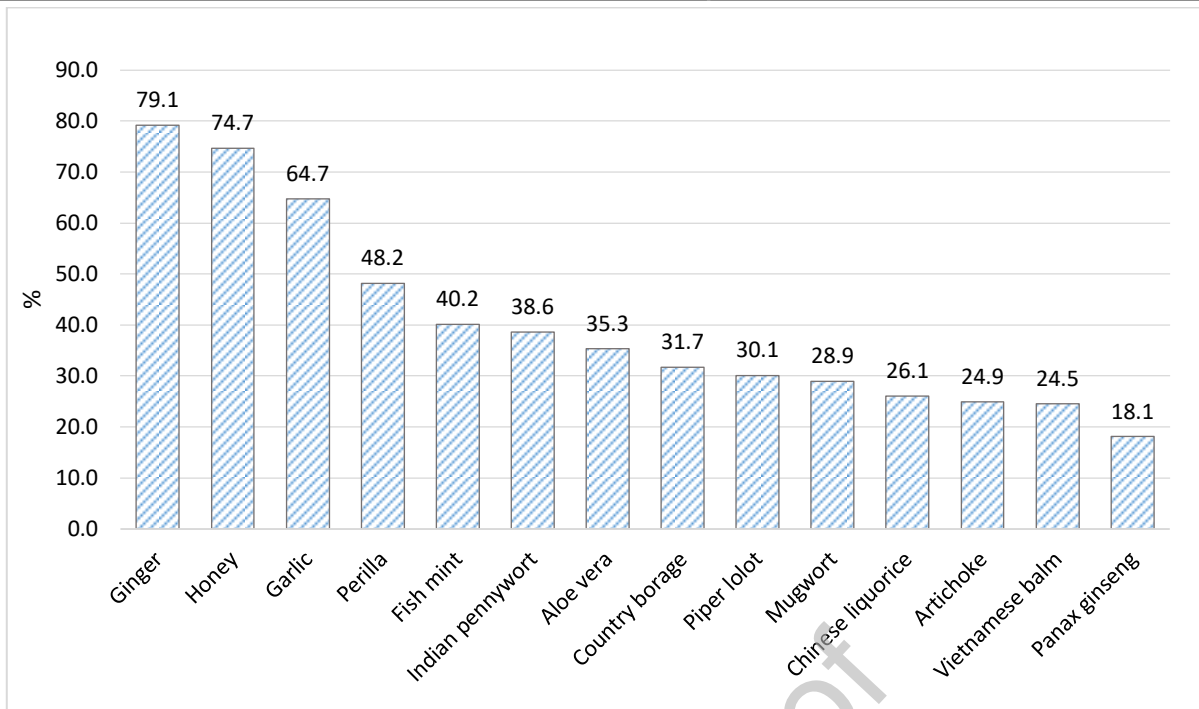
Figure 1. The most common herbal medicine used in Vietnam during COVID-19 pandemic (N = 508): Ginger (*Zingiber officinale* Rosc.), Honey (*Mel*), garlic (*Allium sativum* L.), Perilla (*Perilla frutescens* (L.) Britt.), Fish mint (*Houttuynia cordata* Thunb.), Indian pennywort (*Centella asiatica* Urb.), Aloe vera (*Aloe vera* (L.) Burm.f.), Country borage (*Plectranthus amboinicus* (Lour.) Spreng), Piper lolot (*Piper lolot* C.DC.), Mugwort (*Artemisia vulgaris* L.), Chinese liquorice (*Glycyrrhiza spp.*), Artichoke (*Cynara cardunculus* L. var. *scolymus* (L.) Fiori), Vietnamese balm (*Elsholtzia ciliata* Thunb.), Panax ginseng (*Panax ginseng* C.A.Mey) (n = 249).
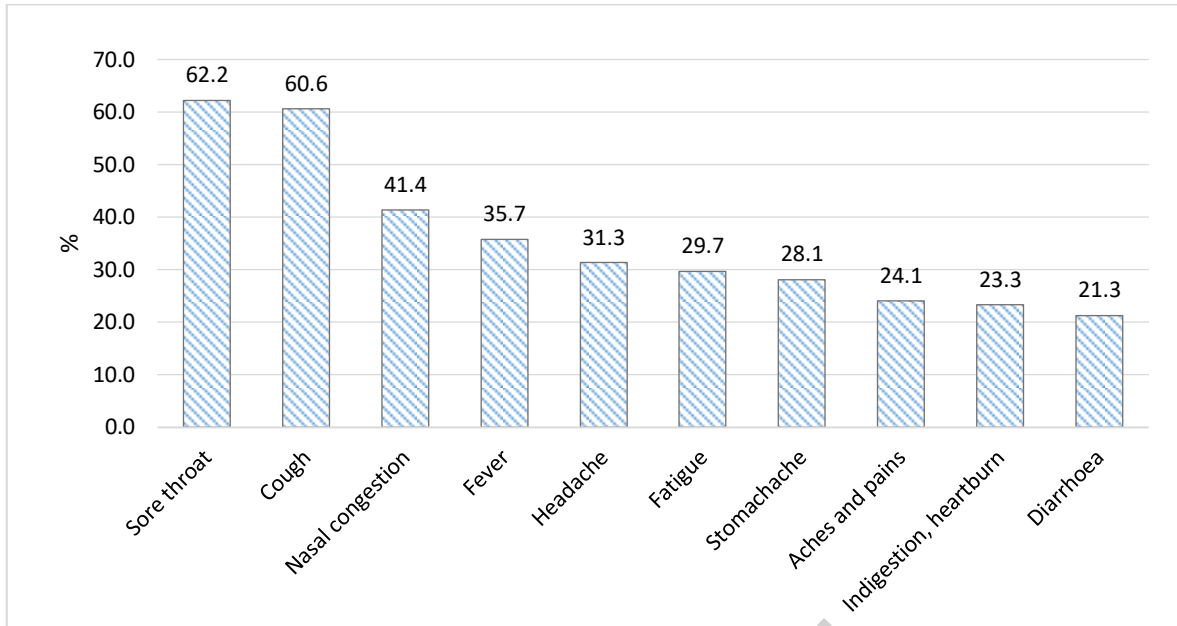
Figure 2. The most common indications for herbal medicine use during COVID-19 (n = 249).