AMJ Australasian Medical Journal [AMJ 2018;11(3):153-162]

The use of traditional medicines to lower blood pressure: A survey in rural areas in Yogyakarta

Riana Rahmawati[1,2], Beata Bajorek[1]

1. Graduate School of Health, Discipline of Pharmacy, the University of Technology Sydney, NSW, Australia
2. Department of Pharmacology, Faculty of Medicine, Islamic University of Indonesia, Yogyakarta, Indonesia

RESEARCH

Please cite this paper as: Rahmawati R, Bajorek B, The use of traditional medicines to lower blood pressure: A survey in rural areas of Yogyakarta province, Indonesia. AMJ 2018;11(3):153–162.
https://doi.org/10.21767/AMJ.2018.3269

Corresponding Author:
Riana Rahmawati
Graduate School of Health (Pharmacy), University of Technology Sydney
Email: riana.rahmawati@uii.ac.id

ABSTRACT

Background
Despite common usage of traditional medicines in rural populations, information about their use along with anti-hypertensive medications is limited.

Aims
To quantify the use of traditional medicines and to identify factors associated with their use among people with hypertension in a low-resource setting in Indonesia.

Methods
Data were collected using a researcher-administered questionnaire from people with hypertension in rural villages in Yogyakarta, Indonesia.

Results
Two hundred sixty-three of 384 participants (68.5 per cent) used traditional medicines to help lower their blood pressure; about half (n=134) used only traditional medicines, and the other half (n=129) also took anti-hypertensive medications. Seventy-four participants (19.2 per cent) took only anti-hypertensive medications, and 47 (12.2 per cent) used neither traditional medicines nor anti-hypertensive medications. Herbal medicines were the most frequent products used, mainly herbs and herbal materials, which were obtained from traditional markets (n=169, 44 per cent), family members (n=100, 26 per cent) or their own garden (n=88, 23 per cent). The use of traditional medicines was not associated with any specific sociodemographic variables. However, among traditional medicines users, participants with a lower level of formal education were twice as likely to not take anti-hypertensive medications compared with those with a higher level of education.

Conclusion
To treat their hypertension, these rural villagers used traditional medicines more often than anti-hypertensive medications. Health professionals in rural areas should be aware of how the use of traditional medicine might affect hypertension management.

Key Words
Hypertension, self-medication, traditional medicines, herbal medicines, rural health

What this study adds:

1. What is known about this subject?
People around the world commonly use traditional medicines both for maintaining health and for treating chronic diseases such as hypertension.

2. What new information is offered in this study?
Consuming foods (e.g., cucumbers) is commonly perceived by people to have a blood pressure lowering effect and is primarily underpinned by patients' self-perceived needs to lower their blood pressure (self-diagnosis and self-treatment).

3. What are the implications for research, policy, or practice?
The villagers' heavy reliance on traditional medicines may interfere with the opportunity for healthcare professionals

to effectively manage their blood pressure.

Background

The World Health Organization (WHO) has reported that more than 80 per cent of the population in developing countries uses traditional medicines to maintain their health and treat various types of clinical conditions.[1] Due to the lack of accessible and affordable healthcare services, traditional medicine becomes a primary source of treatment, and sometimes the only source of care in these countries.[1] A tropical country, Indonesia has an abundance of plants, with potential medicinal properties, that are used traditionally as medicines.[2] The use of traditional medicines is more prevalent in rural areas, where cultural factors and beliefs strongly influence patients' decisions about the source of health care, as compared to urban areas.[3,4] The lack of access to medication and information may also influence preferences for using traditional medicines in rural areas.[3]

In a national survey, 46.4 per cent of rural Indonesians were diagnosed with hypertension, but only 9 per cent of them were adequately treated.[5] People with chronic conditions such as hypertension tend to self-manage their blood pressure by various means, including the use of traditional medicines.[6] One review reported that, on average, 38 per cent of patients with hypertension use traditional medicines for any health condition and 25 per cent of all patients specifically use traditional medicines to lower blood pressure.[7] However, on average, only 21 per cent of patients disclosed their traditional medicine use to their healthcare providers.[7] Despite this acknowledged use of traditional medicines by rural people,[4] the use of traditional medicines along with hypertension medications has been scarcely reported.[8] With a view towards suggesting measures for improving the management of hypertension in rural Indonesian people, the objectives of this study were to: quantify the use of traditional medicines; describe the types of traditional medicines used; and identify any factors that may be associated with the use of traditional medicines among people diagnosed with hypertension in rural villages of Yogyakarta province, Indonesia.

Method

Design and setting

This cross-sectional study was undertaken in the Bantul district (Yogyakarta, Indonesia) from August to November 2015. The analysis presented here is part of a larger study exploring medication-taking practices among people with hypertension in rural underdeveloped areas, which has been reported elsewhere.[9] The Bantul district is located in Yogyakarta province on the island of Java, the most populous island in Indonesia.[10] The villages were selected based on a list identifying rural underdeveloped villages from the Bantul District Government.[11] The study was approved by the Human Research Ethics Committee of the University of Technology Sydney. Approval from the Bantul District Government was also granted.

Terminology used in this study

The term 'traditional medicines' is used interchangeably with 'complementary and alternative medicines' (CAMs) in some countries.[1] Given the wide variation in defining traditional medicines and CAMs,[7,12] we adopted the WHO terminology to classify the types of traditional medicines used by participants.[1,4] The WHO defines traditional medicines as "the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether applicable or not, used in the maintenance of the health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness"[1] It might contain parts of plants, other plant materials, non-plants materials (e.g., animal and mineral), or a combination of them.[1] According to the WHO, herbal medicine is a part of traditional medicines and can be divided into herbs, herbal materials, herbal preparations, and finished herbal products. Herbs and herbal materials refer to the use of plants such as leaves, flowers, fruit, seed, and wood or other plant parts, that can be used 'as is' or be processed using various local procedures (e.g., steaming, roasting).[1] Herbal preparations are the basis of finished herbal products. Both terms refer to herbal products produced by extraction, fractionation, purification, concentration, or other manufacturing processes.[1]

Recruitment of participants

The inclusion criteria for the study were that participants had to be village residents, aged 45 years or older, diagnosed with hypertension by a healthcare professional or currently taking anti-hypertensive medication. People with hypertension were recruited through a local health service that offers a mobile service provided by the local hospital in selected villages. Community (lay) health workers (CHWs) distributed an invitation letter to people who were known to have hypertension as recorded by hospital staff, and to members of the Integrated Health Service Post for the Elderly (IHSP-Elderly), a CHW-based program in the villages, who were known to have hypertension. The CHWs helped the researcher collect the villagers'expressions of interest in participating. Informed written consent was obtained from literate participants. Participants who were

illiterate gave informed consent by providing a thumb print on the informed consent sheet, and a literate witness provided his/her signature on the sheet.

Data collection

A semi-structured questionnaire was used to gather information about the participants' socio-demographic characteristics, history of hypertension, hypertension knowledge, and all medicines used within the preceding 30 days. This questionnaire was administered by an Indonesian researcher (RR) in Bahasa Indonesia or the local language. Participants chose the venue for interviews to take place, for their convenience and to provide their preferred level of privacy.

Participants were asked "Have you taken any other medicines (herbal medicines, home remedies, or other traditional medicines) to lower your blood pressure in the preceding 30 days?" Those who responded "Yes" to this question were then asked about the types of traditional medicines used and how they used these medicines. Participants were also asked "Have you taken any anti-hypertensive medications within the preceding 30 days?" Hypertension knowledge was examined using a standardised instrument described in a previous study,[13] which comprised 10 questions with multiple-choice answers. Participants who answered eight or more questions correctly (score ≥8) were considered to have good knowledge and those who scored <8 were categorised as possessing poor knowledge.

Data analysis

Descriptive statistics were used to analyse the baseline characteristics of the participants. A comparison between traditional users and non-users was performed using the chi-square test for categorical variables and the Mann–Whitney U test for continuous variables. Independent variables included gender, age group, employment, level of education, presence of chronic disease, years since diagnosis, distance from the community health centre (CHC), and hypertension knowledge. All analyses were performed using IBM SPSS for Windows (version 23.0). A *p*-value of <0.05 was considered to be statistically significant. Analysis using logistic regression analysis was performed to identify factors associated with the use of anti-hypertensive medications in traditional medicine users.

Results

Characteristics of participants

Of the 384 rural villagers who participated in this study, 288 (75 per cent) were female, 246 (64.1 per cent) had no formal education or had completed elementary school only, 259 (67.4 per cent) were employed, and 175 (45.1 per cent) were younger than 65 years (Table 1). The mean age was 65.7 [SD 10.3] years (range: 45–90 years). Most participants (n=349, 90.9 per cent) had health insurance; and most (n=339, 88.3 per cent) were enrolled in a government health insurance scheme. A history of other chronic diseases (besides hypertension) was reported by 249 (64.8 per cent) participants. Analysis of the participants' hypertension knowledge showed that most had a low level of hypertension knowledge; 325 of 384 participants (84.6 per cent) scored <8 on the knowledge questionnaire (Table 1).

Use of traditional medicines and anti-hypertensive medications

Among 384 participants, 263 (68.5 per cent) used traditional medicines intended to lower blood pressure within the preceding 30 days; 129 (49 per cent) reported the use of traditional medicines and anti-hypertensive medication in the preceding 30 days, and 134 (51 per cent) participants used only traditional medicines (Table 2). Among 203 participants who took anti-hypertensive medications, 109 (53.7 per cent) participants reported the use of captopril as monotherapy. Forty-seven (12.2 per cent) participants had taken neither anti-hypertensive medication nor traditional medicines in the preceding 30 days.

There were no differences (p>0.05) between traditional medicines users and non-users in terms of age, gender, educational level, occupation, distance from the nearest CHC, health insurance status, presence of other chronic diseases, and hypertension knowledge.

Factors associated with the use of anti-hypertensive medications were assessed in traditional medicine users (n=263). Univariate and multivariate regression logistic analyses showed that, among traditional medicines users, a low educational level was the only factor associated with the use of anti-hypertensive medications (Table 2). Participants who had not completed elementary school were 2.1 times more likely to use only traditional medicines and to not take anti-hypertensive medications.

Sixty-seven (25.5 per cent) participants responded that they did not obtain traditional medicines directly but instead received their traditional medicines from their family members or neighbours. The most common places to purchase traditional medicines were local markets (n=169, 44 per cent), *warung* stalls/corner shops (n=44, 11 per cent)

located near the participants' home, and pharmacies (n=8, 3 per cent).

Types of traditional medicines used

Herbal medicines: herbs and herbal materials

One hundred and sixty-three of the 263 (62 per cent) users of traditional medicines reported using cucumber (*Cucumis sativus*), which is traditionally believed to have blood pressure lowering effect (Table 3). Participants also reported the use of watermelon (*Citrullus lanatus*; n=137, 35.7 per cent), melon (*Cucumis melo L.*; n=126, 32.7 per cent), celery (*Apium graveolens*), chayote (*Sechium edule*), yam bean (*Pachyrhizus erosus*), achi (*Morinda citrifolia*), and garlic (*Allium sativum*). Participants noted that they did not consume these herbs on a daily basis, but instead they began taking herbs when they perceived that their blood pressure was high (self-diagnosis). The frequency and duration of use depended primarily on their self-perceived need to lower their blood pressure (self-treatment).

Participants also used herbal materials, which were processed simply at home by participants or family members. They included the use of soursop leaves (*Annona muricata*; n=30, 11.7 per cent), green cincau leaves (*Premna oblongifolia Merr.*), bay leaves (*Eugenia polyantha*), gooseberry leaves (*Physalis angulata L.*), avocado leaves (*Persea americana*), red betel leaves (*Piper crocatum*), and binahong leaves (*Anredera cordifolia*). Some participants cited their specific recipe for use, for example: "I put seven soursop leaves into one litre of water and then boil this until the volume is reduced to 1–2 glasses". The other materials processed traditionally to lower blood pressure were mangosteen skin (*Garcinia mangostana*), mahogany seeds (*Swietenia macrophylla*), kidney tea plants (*Orthosiphon aristatus*), brotowali (*Tinospora cordifolia*) and wild sugarcane (*Saccharum spontaneum*) (Table 3). The raw materials for these kinds of herbal medicines were obtained from the participants' own land (farm, garden, or field), neighbour's land, or the forest near their village.

Among the 263 herbal medicine users, 39 (14.8 per cent) purchased herbal materials (*jamu*) from local markets, herbal shops, or pedlars. The *jamu* pedlars travelled between villages by foot or bicycle in response to the villagers' requests; their *jamu* is called *jamu gendong*, which is provided as a ready-to-drink liquids. These 39 participants could not provide detailed information about the materials used to make the *jamu*.

Herbal medicines: Herbal preparations and finished herbal products

Only eight participants reported that they purchased manufactured herbal products from pharmacies (Table 3). These included Cuka Apel® (apple cider vinegar), Bio Moringa® (an extraction of *Moringa oleifera*, *Annona muricata*, and *Garcinia mangostana*), and Bio Activa® (an extraction of *Oryza sativa glutinosa, Saccharum officinarum, Curcuma xanthorrhiza rhizoma, Pandanus amaryllifolius, Annona muricata folium, Nigella sativa semen, Syzygium polyanthum folium, Imperata radix, Allium sativum*, and *Oryza sativa*).

Other types of traditional medicines

Seven participants reported the traditional use of insects to manage their hypertension, such as Japanese ant (*Hymenoptera*: *Formicidae*; n=4). When preparing this traditional medicine, the participants put 1–2 live ants in a glass of hot water, and once the ants had died, they drank the water. All four participants reported obtaining the ants for the first time from a neighbour, after which they bred the ants themselves. The other insects reportedly used were termite nests (n=1) and antlions (*Myrmeleontidae*; n=2); the antlions were consumed alive.

Discussion

This study has shown that people in rural underdeveloped areas use traditional medicines to lower blood pressure more frequently than they use anti-hypertensive medications. The proportion of users of traditional medicines in this study is higher than that reported among people with hypertension in other community-based surveys in Uganda,[14] South Africa[15] and Nigeria.[16]

The perception that the use of traditional medicines only is sufficient to control blood pressure may provide patients a greater sense of control over their healthcare decisions.[17] Previous studies have identified that patients' belief about the efficacy and safety of natural products, ease of access, lower cost, recommendations from family members/peers, and the fact that traditional medicines are culturally acceptable, are the major reasons for the use of traditional medicines.[1,14] The tendency to self-medicate with traditional medicines is also related to the fear of adverse effects from long-term use of anti-hypertensive medications,[6,18] which leads to poor medication adherence.[19] In this study, a substantial proportion of participants used only traditional medicines to lower their high blood pressure, particularly those with a low educational level. Given that such patients usually also have a low level of health literacy,[20] any interventions should be

communicated and delivered appropriately.[21] Findings in this study indicate the need for further studies to develop tailored interventions to better support patients with hypertension in rural community setting in appropriate self-management to achieve and maintain blood pressure control.

The consumption of cucumber, watermelon, and melon as a kind of 'medicine' to lower blood pressure, as found in this study, has been reported in other rural communities in Indonesia[8] and other developing regions such as Palestine.[22] Extracts of cucumber and watermelon may have potential roles as anti-hypertensive agents;[23,24] however, the evidence from clinical practice is weak. Similar to previous studies,[8,22] this study classified these fruits/vegetables as herbs because they were not consumed as part of the daily diet but instead were consumed with the intention of lowering blood pressure and were expected to provide an immediate blood pressure-lowering effect. This practice differs from dietary recommendations to eat more fruits/vegetables as listed in the Dietary Approaches to Stop Hypertension,[25,26] which focuses on long-term dietary changes for the control of hypertension and broader reduction of cardiovascular risk.[27] Indeed, even though lifestyle measures are known to improve blood pressure control in patients with hypertension,[25,27] most patients with hypertension need anti-hypertensive medications to achieve their blood pressure target.[28]

Herbs and herbal materials were commonly used by the rural villagers in this study to manage their hypertension. Although the anti-hypertensive properties of some herbs have been acknowledged,[29-31] evidence is lacking regarding their efficacy and safety in practice.[1,30] For example, the reported microbial contamination in Indonesian *jamu gendong* suggests poor standards of hygiene in the preparation process.[32] Despite the implementation of the Indonesian national policy on traditional medicine use in 2007, the scope of safety evaluation and registration does not cover homemade herbal medicines and *jamu gendong*.[4] Given the question about the safety use of traditional medicines, it is important that healthcare workers inquire about the use of traditional medicines during patient encounters. Patients must be informed that a 'natural' product might have potentially harmful hidden ingredients. For example, the use of Japanese ants, as also reported in this study, has become popular in Indonesia in recent years,[33] although there are no data regarding the effects on health. The findings in this study suggest that health professionals need to understand their patients' views about the use of traditional medicines, to assess the potential risks of the use of such products and help patients become better informed about their choice of treatment.

This study has some limitations. The results of this study should be understood in the context of the inclusion of participants from areas in rural settings in one district in Indonesia, and any generalizations should be made cautiously. Our methods for reporting and categorizing traditional medicine use may be subject to issues relating to the self-reporting method. In addition, a patient's self-report about the latest blood pressure reading does not allow for assessment of the relationship between the use of traditional medicines and blood pressure control. Another limitation is the lack of detailed probing questions about why patients took traditional medicines. Despite these limitations, the findings provide valuable information about the use of traditional medicines among rural people with hypertension that need to be addressed by the healthcare system.

Conclusion

This study found that rural villagers used traditional medicines more often than anti-hypertensive medicine to lower blood pressure. Herbs and herbal materials were commonly used as primary ways to manage blood pressure. Healthcare workers in rural areas should improve their awareness of the use of traditional medicines and how it might affect hypertension management particularly among patients with low educational level.

References

1. World Health Organization. WHO Traditional Medicine Strategy 2014 - 2023. Geneva, Switzerland: World Press, World Health Organization, 2013.
2. Elfahmi, Woerdenbag HJ, Kayser O. Jamu: Indonesian traditional herbal medicine towards rational phytopharmacological use. J Herb Med. 2014; 4: 51-73.
3. Assan JK, Assan SK, Assan N, et al. Health Inequality in Resource Poor Environments and the Pursuit of the MDGs Traditional versus Modern Healthcare in Rural Indonesia. J Health Manag. 2009; 11: 93-108.
4. World Health Organization Regional Office for South East Asia. Traditional Medicine in Republic Indonesia-Indonesian Traditional Medicine National Strategy and Scope of Cooperation: 23-36. http://www.searo.who.int/entity/medicines/topics/traditional_medicines_in_republic_of_indonesia.pdf.
5. Hussain MA, Al Mamun A, Reid C, et al. Prevalence, Awareness, Treatment and Control of Hypertension in Indonesian Adults Aged≥ 40 Years: Findings from the

Indonesia Family Life Survey (IFLS). PloS One. 2016; 11: e0160922.
6. Marshall IJ, Wolfe CDA, McKevitt C. Lay perspectives on hypertension and drug adherence: systematic review of qualitative research. Brith Med J. 2012; 345:e3953 https://doi.org/10.1136/bmj.e3953.
7. Rahmawati R, Bajorek BV. Self-medication among people living with hypertension: a review. Fam Pract. 2017; 34: 147-153.
8. Basuki B, Siagian M, Ilyas EI, et al. Combined traditional medicine and pharmacological antihypertensive drugs in a rural community of West Java, Indonesia. Med J Indones. 2004; 13: 246-251.
9. Rahmawati R, Bajorek B. Access to medicines for hypertension: A survey in rural Yogyakarta province, Indonesia. Rural Remote Health. Forthcoming April 2018.
10. Ministry of Health Republic of Indonesia. Gambaran kesehatan lanjut usia di Indonesia. Buletin Jendela Data dan Informasi Kesehatan. 2013; 1. http://www.depkes.go.id/download.php?file=download/pusdatin/buletin/buletin-lansia.pdf
11. Bantul District Government. Bantul- The Harmony of Nature and Culture (Database Profile of the Bantul District). Regional Planning Body, Government of Bantul District, Yogyakarta, Indonesia. 2013: 16-24
12. Frass M, Strassl RP, Friehs H, et al. Use and acceptance of complementary and alternative medicine among the general population and medical personnel: a systematic review. Ochsner J. 2012; 12: 45-56.
13. Williams MV, Baker DW, Parker RM, et al. Relationship of functional health literacy to patients' knowledge of their chronic disease: a study of patients with hypertension and diabetes. Arch Intern Med. 1998; 158: 166-172.
14. Nuwaha F, Musinguzi G. Use of alternative medicine for hypertension in Buikwe and Mukono districts of Uganda: a cross sectional study. BMC Complement Altern Med. 2013; 13: 301. http://dx.doi.org/10.1186/1472-6882-13-301.
15. Hughes GD, Aboyade OM, Clark BL, et al. The prevalence of traditional herbal medicine use among hypertensives living in South African communities. BMC Complement Altern Med. 2013; 13: 38. http://dx.doi.org/10.1186/1472-6882-13-38.
16. Osamor PE, Owumi BE. Complementary and alternative medicine in the management of hypertension in an urban Nigerian community. BMC Complement Altern Med. 2010; 10: 36. http://dx.doi.org/10.1186/1472-6882-10-36.
17. Sarahroodi S. Self-medication: Risks and Benefits. Int J Pharmacol. 2012; 8: 58-59.
18. Rahmawati R, Bajorek B. Perspectives on antihypertensive medication: a qualitative study in a rural Yogyakarta province in Indonesia. Drugs Ther Perspect. 2016; 32: 76-83.
19. Krousel-Wood M, Thomas S, Muntner P, et al. Medication adherence: a key factor in achieving blood pressure control and good clinical outcomes in hypertensive patients. Curr Opin Cardiol. 2004; 19: 357-362.
20. van der Heide I, Wang J, Droomers M, et al. The relationship between health, education, and health literacy: results from the Dutch Adult Literacy and Life Skills Survey. J Health Commun. 2013; 18 Suppl 1: 172-184.
21. Sheridan SL, Halpern DJ, Viera AJ, et al. Interventions for individuals with low health literacy: a systematic review. J Health Commun. 2011; 16 Suppl 3: 30-54.
22. Ali-Shtayeh MS, Jamous RM, Jamous RM, et al. Complementary and alternative medicine (CAM) use among hypertensive patients in Palestine. Complement Ther Clin Pract. 2013; 19: 256-263.
23. Shah P, Dhande S, Joshi Y, et al. A review on Cucumis sativus (Cucumber). Research Journal of Pharmacognosy and Phytochemistry. 2013; 5: 49-53.
24. Massa NM, Silva AS, Toscano LT, et al. Watermelon extract reduces blood pressure but does not change sympathovagal balance in prehypertensive and hypertensive subjects. Blood Press. 2016; 25: 244-248.
25. Moore TJ, Conlin PR, Ard J, et al. DASH (Dietary Approaches to Stop Hypertension) diet is effective treatment for stage 1 isolated systolic hypertension. Hypertension. 2001; 38: 155-158.
26. Chen ST, Maruthur NM, Appel LJ. The effect of dietary patterns on estimated coronary heart disease risk results from the Dietary Approaches to Stop Hypertension (DASH) trial. Circ Cardiovasc Qual Outcomes. 2010; 3: 484-489.
27. Sacks FM, Svetkey LP, Vollmer WM, et al. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. N Engl J Med. 2001; 344: 3-10.
28. Chobanian AV, Bakris GL, Black HR, et al. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. J Am Med Assoc. 2003; 289: 2560-2571.
29. Nwokocha CR, Owu DU, Gordon A, et al. Possible mechanisms of action of the hypotensive effect of

Annona muricata (soursop) in normotensive Sprague-Dawley rats. Pharm Biol. 2012; 50: 1436-1441.
30. Coria-Téllez AV, Montalvo-Gónzalez E, Yahia EM, et al. Annona muricata: A comprehensive review on its traditional medicinal uses, phytochemicals, pharmacological activities, mechanisms of action and toxicity. Arab J Chem. http://dx.doi.org/10.1016/j.arabjc.2016.01.004
31. Sundari F, Amalia L, Ekawidyani KR. Minuman cincau hijau (Premna oblongifolia Merr.) dapat menurunkan tekanan darah pada wanita dewasa penderita hipertensi ringan dan sedang. Jurnal Gizi dan Pangan. 2014; 9(3):203-210
32. Limyati DA, Juniar BL. Jamu Gendong, a kind of traditional medicine in Indonesia: the microbial contamination of its raw materials and endproduct. J Ethnopharmacol. 1998; 63: 201-208.
33. Semut Jepang, serangga yang bisa menyembuhkan penyakit?[Japanese ants, do they treat any diseases?], available at: http://health.liputan6.com/read/2277310/semut-jepang-serangga-yang-bisa-menyembuhkan-penyakit (2015, accessed 27 February 2017).

ACKNOWLEDGEMENTS

The authors acknowledge the participation of all participants in the study. The authors are also thankful to all community health workers in the villages for their assistance during the study.

PEER REVIEW

Not commissioned. Externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

FUNDING

The first author was supported by the Directorate General of Higher Education Indonesia (DIKTI) Indonesia (Grant number 2925/E4.4/K/2013) for her PhD study at the University of Technology Sydney

ETHICS COMMITTEE APPROVAL

Human Research Ethics Committee of the University of Technology Sydney (Ref. No 2014000647)

Table 1: Factors associated with the use of traditional medicines among rural Indonesian people with hypertension (n=384)

Items	Overall n=384 (100%)	Traditional medicine user (within the last 30 days)		p value (2-sided)
		Yes n= 263 (68.50)%	No n= 121 (31.50)%	
Age categories, n (column %)				
<65 years	173 (45.1)	118 (44.9)	55 (45.5)	0.91
≥65 years	211 (54.9)	145 (55.1)	66 (54.5)	
Gender, n (%)				
Female	288 (75)	193 (73.4)	95 (78.5)	0.31
Male	96 (25)	70 (26.6)	26 (21.5)	
Education level, n (column %)				
Less than elementary school	246 (64.1)	171(65)	75 (62)	0.57
Elementary school or higher	138 (35.9)	92 (35)	46 (38)	
Occupation, n (column %)				
Unemployed	125 (32.6)	79 (30)	46 (38)	0.13
Employed	259 (67.4)	184 (70)	75 (62)	
Distance from the nearest CHC in km, mean (SD)	4.1 (2.3)	4.2 (2.3)	4.1 (2.4)	0.33
Health insurance holder, n (column %)				
Yes	349 (90.9)	239 (90.9)	110 (90.9)	1.0
No	35 (9.1)	24 (9.1)	11 (9.1)	
Presence of other chronic diseases*, n (column%)				
Yes	249 (64.8)	170 (64.6)	79 (65.3)	1.0
No	135 (35.2)	93 (35.4)	42 (34.7)	
Years since diagnosis, mean±SD	3.9±3.9	3.8±3.7	4.0±4.2	0.61
Hypertension knowledge, n (column %)				
Low, score <8	325 (84.6)	228 (86.7)	97 (80.2)	0.13
High, score ≥8	59 (15.4)	35 (13.3)	24 (19.8)	

n=number, SD=standard deviation, CHC=community health centre

* Chronic diseases included health practitioner diagnosed diabetes, chronic back pain, arthritis, neurological disorder including stroke, lung disease, renal disease, liver disease, peptic ulcer disease, cancer, allergy and depression.

Table 2: Use of anti-hypertensive medications among traditional medicine users and factors predicting their use (n=263)

Variable items	Have you taken any anti-hypertensive medications within preceding 30 days?		Univariate analysis			Multivariate analysis		
	Yes n= 129 (49%)	No n= 134 (51%)	Odds Ratio	95% CI	P value	Odds Ratio	95%CI	P value
Age categories, n (row %)								
< 65 years	61 (51.7)	57 (48.3)	1.21	0.74-1.97	0.44	NA	NA	NA
≥ 65 years	68 (46.9)	77 (53.1)	1.0					
Gender, n (row %)								
Male	43 (61.4)	27 (38.6)	1.98	1.13-3.46	0.02	1.7	0.96-3.03	0.07
Female	86 (44.6)	107 (55.4)	1.0					
Education level, n (row %)								
Less than elementary school	71 (41.5)	100 (58.5)	1.0	1.42-4.04	0.001	2.1	1.22-3.58	0.007
Elementary school or higher	58 (63.0)	34 (37.0)	2.4					
Occupation, n (row %)								
Unemployed	40 (50.6)	39 (49.4)	1.1	0.65-1.86	0.74			
Employed	89 (48.4)	95 (51.6)	1.0					
Distance from the nearest CHC in km, mean±SD	3.9 ± 2.2	4.5±2.3	1.12	1.01-1.26	0.03	1.09	0.98-1.22	0.13
Health insurance holder, n (row %)								
Yes	115 (48.1)	124 (51.9)	1.0					
No	14 (58.3)	10 (41.7)	1.39	0.59-3.29	0.46	NA	NA	NA
Years since diagnosis, mean±SD)	4.0±3.8	3.6±3.7	0.97	0.91-1.03	0.34	NA	NA	NA
Knowledge about hypertension, n (row %)								
Low, score <8	108 (47.4)	120 (52.6)	1.0					
High, score ≥8	21 (60.0)	14 (40.0)	1.67	0.81-3.44	0.17	NA	NA	NA
Presence of other chronic diseases[†], n (row %)								
Yes	85 (50.0)	85 (50.0)	1.11	0.67-1.85	0.68	NA	NA	NA
No	44 (47.3)	49 (52.7)						

n=number, SD=standard deviation, NA=not available, CHC=community health centre

* Chronic diseases included health practitioner diagnosed diabetes, chronic back pain, arthritis, neurological disorder including stroke, lung disease, renal disease, liver disease, peptic ulcer disease, cancer, allergy and depression.

Table 3: Types of traditional medicines self-reportedly used to lower blood pressure among rural Indonesian people with hypertension (n=263)

Types of traditional medicines	Frequency (%)	Part(s) used	Preparation
Herbal medicines			
Herbs and herbal materials			
Cucumber (*Cucumis sativus*)	163 (62)	Whole plant	Just eat as a salad Crush and squeeze to get the juice
Watermelon (*Citrullus lanatus*)	94 (35.7)	Fruit	Just eat as a fruit Drink as a juice
Melon (*Cucumis melo)*	86 (32.7)	Fruit	Just eat as a fruit Drink as a juice
Soursop l*(Annona muricata)*	30 (11.7)	Leaves	Boil the leaves, keep cold, and drink
Green cincau *(Premna oblongifolia Merr.)*	19 (7.4)	Leaves	Crush and squeeze, steep in a bowl of warm water and drink
Celery (*Apium graveolens*)	16 (6.2)	Leaves, rod	Steep in a glass of hot water, keep cold, and drink
Achi (*Morinda citrifolia)*	13 (5.1)	Fruit	Just eat the ripe Achi Boil the raw Achi, keep cold, and drink the liquid
Chayote (*Sechium edule)*	12 (4.7)	Fruit	Drink as a juice
Bay (*Eugenia polyantha)*	12 (4.7)	Leaves	Steep in a glass of hot water, keep cold, and drink
Gooseberry (*Physalis angulata)*	7 (2.7)	Leaves	Just eat as a salad
Avocado (*Persea americana*)	6 (2.3)	Leaves	Boil the leaves, keep cold and drink
Red betel *(Piper crocatum)*	3 (1.2)	Leaves	Steep in a glass of hot water, keep cold, and drink
Mangosteen (*Garcinia mangostana*)	3 (1.2)	Skin	Boil the skin, keep warm, and drink
Mahogany (*Swietenia macrophylla*)	2 (0.8)	Seed	Eat as a pill
Kidney Tea Plants/Java Tea (*Orthosiphon aristatus*)	2 (0.8)	Leaves	Steep in a glass of hot water, keep cold, and drink
Garlic (*Allium sativum*)	2 (0.8)		Eat as a salad
Bratawali (*Tinospora cordifolia*)	1 (0.4)	Leaves	Boil the leaves, keep cold and drink
Glagah (wild sugarcane, *Saccharum spontaneum*)	1 (0.4)	Leaves, rod	Boil the leaves/rod, keep cold and drink
Binahong l (*Anredera cordifolia*)	1 (0.4)	Leaves	Boil the leaves, keep cold and drink
Unknown compounds – traditional herbal medicines (*jamu*)	39 (14.8)		Ready-to-drink, no preparation needed
Herbal preparations and manufactured herbal products			
Bioactiva® (herbal medicines)*	5 (1.9)		N/A
Cuka apel ® (Apple cider vinegar)	1 (0.4)		N/A
Bio Moringa® (*Moringa oleifera folium*, *Annona muricata folium*, and *Garcinia mangostana pericarpium*)	2 (0.8)		N/A
Other traditional medicines			
Japanese ant (*Hymenoptera: Formicidae*)	4 (1.6)	Whole body	Steep in a glass of hot water, and eat once the ants have died
Antlions (*Myrmeleontidae*)	2 (0.8)	Whole body	N/A (eat alive)
Termite nest	1 (0.4)	Nest	Boil the nest, keep warm, and drink the liquid

*herbal medicines, as liquid, the ingredients of Bioactiva®: Oryza sativa glutinosa, Saccharum officinarum, Curcuma xanthorrhiza rhizoma, Pandanus amaryllifolius, Annona muricata folium, Nigella sativa semen, Syzygium polyanthum folium, Imperata radix, Allium sativum, Oryza sativa