



## Original Article

# The use of herbal medicines by the elderly in rural area in Indonesia: A cross-sectional study among Acehnese

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## Abstract

The use of herbal medicines has become increasingly popular worldwide. Elderly has been associated with higher consumption of many medications, including herbal medicines. However, there is a lack of documentation of medicinal herbs use among Acehnese population. Our study aimed at evaluating the profile of herbals use among the elderly population in a rural area of Aceh Province, Indonesia. A cross-sectional study was conducted from October to November 2021 in Nagan Raya Regency of Aceh. To collect information on the use of herbs, a set of structured questionnaires was utilized. The data were presented in percentage (%). A total of 100 respondents were included comprising 54.0% female and most of the respondents aged between 60–64 years (43.0%). The largest percentage of the participants made their own herbal medicines (45.0%) and used them routinely as a habit (36.0%). About 75.0% of the elderly felt better and almost all of them (96.0%) reported no adverse reaction following herbs consumption. A total of 39 plant species were used by the respondents with *Annona muricate L.* was the most frequently used medicinal plant (16.0%) and leaves were the most commonly used parts (68.4%). Most of the herbs were prepared through boiling and squeezing (32.6%), and mainly used in the form of a drink (77.3%). Cough treatment with herbs made up 19.3%, followed by hypertension (18.0%), flatulence (7.6%), dyspepsia (5.8%), and fever (5.8%). Our investigation revealed consistency in the use of some medicinal herbs in the present study with published experimental data. However, since elderlies are often considered vulnerable individuals, the practice of herbal self-remedies among this population should be well-monitored.

**Keywords:** Elderly, herbs, herbal medicine, medicinal plants, alternative medication

## Introduction

The use of herbal medicines, nonprescription drugs containing herbal or natural products, has been increasing and continues to expand across the world (Abdel-Kader et al., 2018; Ismail et al., 2005; Welz et al., 2018). They have been used for centuries and have become an integral part of various cultural practices worldwide (Bandaranayake, 2006; Bodeker, 2005; Mukherjee, 2002). In Malaysia, the use of traditional Chinese medicines among the population has reached approximately 67.7% (Teow et al., 2021). In Indonesia, herbal medicine utilization was reportedly around 50% according to the Indonesian Basic Health Research in 2010 (Riskesmas, 2010), and the percentage was higher (60%) among the population over 15 years of age in 2013 (Riskesmas, 2013). In 2014, the Central Bureau of Statistics (BPS) documented that about 30.1% of the Indonesian population use traditional medicines, and 12.9% of the population practice their own traditional remedies, including self-herb preparation and administration, massages, and other traditional therapies without expert assistance (BPS, 2016).

In Indonesia, the use of herbal medicine has emerged from a long historical tradition of utilizing products of natural origin for therapeutic purposes (Pen et al., 2014).

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Several factors, such as social and economic factors, cultural knowledge, and richness in biodiversity have contributed to the increased demand for natural products (Zank and Hanazaki, 2017). Relatively cheaper in cost and easily obtainable underly the emergence of new traditional medicines from both the pharmaceutical and the home industry (Abdillah et al., 2018). However, the use some traditional medicines is still questionable, particularly in terms of quality, efficacy, content, and safety (Ismail et al., 2005). The diversity of active substances may be inert or toxic, which still requires a lot of studies. The lack of data availability will result in uncontrolled use of traditional medicines, making such cases difficult to handle (Katzung et al., 2014). The lack of systematic observation may lead to the unrecognition of the presence of serious adverse reactions (Byard et al., 2017).

The use of herbal medicines are common among the elderly population, especially those living in rural areas (Ismail et al., 2005; Lima et al., 2019). The presence of serious conditions due to the effects of prescribed drug interactions is one of the reasons behind this choice (Hanlan et al., 2009; Poluan et al., 2020). A study in Saudi Arabia recorded an 89.1% prevalence of polypharmacy in the elderly (Nobili et al., 2011). Another investigation identified prescribed drug interactions among the elderly at 68% (Poluan et al., 2020). Moreover, the elderly is different from younger adults in terms of comorbidities, polypharmacy, and susceptibility to adverse drug reactions, making them a “special population” that requires special health care and treatment.

In this investigation, Kuala Baro was selected to study the profile of herbal utilization among the elderly in Aceh. It is located in the southeast coastal area of Kuala Pesisir District, Nagan Raya Regency. The area is rich in natural resources, including medicinal plants, that are used by the local community for therapeutic purposes to treat several conditions such as coughs, fever, skin-associated diseases, and childbirth-associated medicines. Nevertheless, a comprehensive overview and documentation regarding the use of medicinal herbs, including plant species, methods of preparation and administration, as well as reasons behind the choice among this population is still limited. This study therefore aimed at determining the profile of herbal use among the elderly in Kuala Baro.

## Methods

### Study design and participants

A cross-sectional study was conducted among the elderly population in Kuala Baro, Kuala Pasir District, Nagan Raya Regency, Aceh Province, Indonesia from October–November 2021. Using a consecutive sampling technique, the elderly people who: (1) aged  $\geq 60$  years; (2) were using herbal medicines; and (3) were taking or not taking prescribed medication were included in the study. The size of the sample was decided using a single population proportion formula with an assumption of 0.5% proportion of improper drug use, 5% margin of error, 95% confidence level, and 10% desired absolute level of accuracy, resulting in a final sample size of 100 elderly respondents.

### Study variables and data collection

The elderly is defined as people over 60 years of age (Singh and Bajorek, 2014). To evaluate the use of herbs by the elderly, a set of validated questionnaires was used. The questionnaire included 15 items divided into four parts assessing: (1) participants' demographic characteristics; (2) participants' knowledge and perception towards herbal medicines; (3) participants' experience following the use of medicinal herbs; and (4) the profile of herbal use among participants in terms of plant species, parts of the plants used, methods of preparation and administration, as well as diseases treated.

### Ethical approval

Ethical approval was obtained from the Research Ethic Committee of the Faculty of Medicine, Universitas Syiah Kuala, and Dr. Zainoel Abidin Hospital (Ref No.290/EA/FK-RSUDZA/2021). The patients provided their signed informed consent prior to the study inclusion.

### Statistical analysis

Statistical analysis was performed by means of IBM SPSS and the data were presented in percentages (%). Univariate analysis was performed to determine the frequency distribution of herbal medicine use by the elderly.

## Results

A total of 100 elderly were enrolled for the analysis in the study. The demographic characteristics of the participants are presented in Table 1. More than half of the participants were female (54.0%), and those aged between 60–64 years made up the highest proportion of the respondents (43.0%). In terms of education, the largest percentage of participants had only completed elementary school (40.0%), whereas 24% had completed secondary school, the highest educational level among all participants. About 42% of the participants were unemployed with 28 of them being housewives. Among those who work, 55% were in the private sector (entrepreneur and farmer), whereas 5% were civil servants. Only 29.0% of the participants reported monthly incomes ranging from 1-5 million rupiahs, while the rest (71.0%) earned less than 1 million rupiahs per month.

Table 1. Sociodemographic characteristics of the participants (n=100)

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	46	46.0
Female	54	54.0
Age (years)		
60–64	43	43.0
65–69	28	28.0
70–74	20	20.0
>75	9	9.0
Educational levels		
Uneducated	12	12.0
Elementary school	40	40.0
Lower-secondary school	15	15.0
Higher-secondary school	9	9.0
Did not complete elementary school	24	24.0
Occupation		
Unemployed	14	14.0
Housewife	28	28.0
Entrepreneur	31	31.0
Farmer	22	22.0
Civil servant	5	5.0
Income (IDR)		
< 1 million	71	71.0
1–5 million	29	29.0

Table 2. Participant's knowledge and perception towards herbal medicines (n=100)

Characteristics	Frequency	Percentage (%)
Sources of herbal medicines		
Self-made	45	45.0
Purchasing from market	19	19.0
Purchasing from herb sellers	14	14.0
Purchasing from drug stores	12	12.0
Purchasing from alternative therapists/health practitioners	10	10.0
Reasons for using herbal medicines		
Habit	36	36.0
Safer and natural	33	33.0
Easily obtainable	24	24.0
Modern medicines are prohibitively expensive	7	7.0
Parties suggesting the use of herbal medicines		
None	66	66.0
Family	25	25.0
Friends/neighbors	5	5.0
Health workers	4	4.0
Disclosure of herbal medicine use to doctors		
Yes	6	6.0
No	94	94.0
Barriers to disclosure		
No need to tell doctors	15	15.9
Doctors do not question	69	73.4
Doctors will not support	6	6.4
Others	4	4.2
Results of herbal medicines intake		
Feeling better	75	75.0
No change in condition	25	25.0
Getting worse	2	2.0
Experienced adverse reactions	1	1.0
The presence of unexpected effects		
Yes	4	4.0
No	96	96.0
Attitude toward unexpected effects		
Ignore	24	24.0
Stop using herbs	69	69.0
Consult a doctor/health worker	7	7.0

As shown in Table 2, most of the participants prepared their own herbal medicines (45.0%), while the rest purchased them from markets, herb sellers, drug stores, or alternative therapists. The use of herbals had become a habit for most of the participants (36%), whereas others decided to use herbs as they believed that herbal remedies were safer, easily accessible, and less expensive than modern medications.

About 66% of the participants used herbs solely at their own initiative; whereas the rest were suggested by family (25.0%), friends/neighbors (5.0%), and health workers (4.0%). In terms of participants-medical doctor interactions, the vast majority of the participants (94%) refused to disclose their use of herbal medicines to doctors, believing that it is not necessary for doctors to know (15%). Having not been asked by doctors (69%) and fear of doctors' unsupportive attitude toward the use of herbals (6%) are among other barriers to disclosure.

A large percentage (75%) of participants reported better conditions after using herbs, 25% reported no changes in condition, and 2% declared a worse situation. Only 1% of the participants reported adverse reactions to herbal consumption. Almost all of the elderly respondents (96%) denied the presence of unexpected effects. In case of

developing unexpected reactions, more than half of the participants (69%) will stop using herbs.

Table 3. The profile of herbal use by the elderly

Plant species	Frequency (%)	Treated diseases/usage
Soursop ( <i>Annona muricata</i> L.)	29 (16.0)	Headache, hypertension, cholesterol, fever, pain, diabetes mellitus, flatulence, cough
Sea holly ( <i>Acanthus ilicifolius</i> L.)	5 (2.8)	Cough
Mangkokan ( <i>Nothopanax scutellarium</i> merr.)	6 (3.3)	Gout pain
Papaya ( <i>Carica papaya</i> L.)	4 (2.2)	Kidney stone, hypertension
Tongkat ali ( <i>Eurycoma longifolia</i> )	4 (2.2)	Diabetes mellitus
Henna ( <i>Lawsonia inermis</i> L.)	18 (9.9)	Supplement (immune booster), asthma, cough, hypertension, flatulence, cold
Candle bush ( <i>Senna alata</i> )	5 (2.8)	Headache, cold, fever
Chrysanthus ( <i>Chrysanthemum</i> sp.)	3 (1.7)	Flatulence, cold, dyspepsia
Betle ( <i>Piper betle</i> L.)	1 (0.6)	Cough
Peacock flower ( <i>Caesalpinia pulcherrima</i> )	1 (0.6)	Fever
Bay ( <i>Syzygium polyanthum</i> )	6 (3.3)	Cough, dyspepsia
Amethyst ( <i>Datura metel</i> L.)	5 (2.8)	Toothache
Rambutan ( <i>Nephelium lappaceum</i> L.)	1 (0.6)	Fever
Star fruit ( <i>Averrhoa carambola</i> L.)	9 (5.0)	Hypertension
Ngai camphor ( <i>Blumea balsamifera</i> )	4 (2.2)	Flatulence
Bird's nest fern ( <i>Asplenium nidus</i> )	1 (0.6)	Seizure
Moringa ( <i>Moringa oleifera</i> L.)	1 (0.6)	Seizure
Green grass jelly ( <i>Cyclea barbata</i> )	2 (1.1)	Thrush/internal heat
Indian trumpet ( <i>Oroxylum indicum</i> )	1 (0.6)	Cough
Blackboard tree ( <i>Alstonia scholaris</i> )	5 (2.8)	Lower back pain
King of bitters ( <i>Andrographis paniculate</i> )	4 (2.2)	Fatigue/immune booster
Cacao ( <i>Theobroma cacao</i> )	3 (1.7)	Thrush/internal heat
Kedondong ( <i>Spondias dulcis</i> )	1 (0.6)	Fever
Green grass jelly ( <i>Cyclea barbata</i> )	2 (1.1)	Thrush/internal heat
Cucumber ( <i>Cucumis sativus</i> )	1 (0.6)	Hypertension
Great morinda ( <i>Morinda citrifolia</i> )	1 (0.6)	Cold
Lemon ( <i>Citrus lemon</i> )	6 (3.3)	Cough
Banana ( <i>Musa paradisiaca</i> )	1 (1.1)	Fever
Lime ( <i>Citrus aurantifolia</i> )	2 (1.1)	Cough
Chicle ( <i>Manilkara zapota</i> )	5 (2.8)	Diarrhea
Red onion ( <i>Allium cepa</i> )	1 (0.6)	Cold, flatulence
Turmeric ( <i>Curcuma longa</i> )	8 (4.4)	Dyspepsia, flatulence, cough, sore eye, fever, pain
Ginger ( <i>Zingiber officinale</i> )	4 (2.2)	Immune booster
Javanese ginger ( <i>Curcuma zanthorrhiza</i> )	7 (3.9)	Stomachache, hypertension,
Cilantro ( <i>Coriandrum sativum</i> )	2 (1.1)	Heart disease
Nutmeg ( <i>Myristica fragrance</i> )	4 (2.2)	Bruise, pain
Candlenut ( <i>Aleurites moluccanus</i> )	2 (1.1)	Pain
Crown flower ( <i>Calotropis gigantea</i> )	3 (1.7)	Wound
Heart-leaved moonseed ( <i>Tinospora cordifolia</i> )	5 (2.8)	Immune booster
Total	181 (100)	

Table 4. Distribution of herb utilization according to plant parts, methods of preparation and administration, and treated diseases

Characteristics	Frequency	Percentage (%)
Plant parts		
Leaves	123	67.2
Fruit	20	10.9
Rhizomes	24	13.1
Seed	8	4.4
Stem	8	4.4
Total	183	100
Herbal preparation methods		
Boil	60	32.6
Blend	9	4.9
Squeeze	60	32.6
Grind	19	10.3
Grate	7	3.8
Soak	6	3.3
Knead	16	8.7
Peel	4	2.8
Torn	3	1.6
Total	184	100
Herbal administration methods		
Drink	140	77.3
Eat	4	2.2
Compress	10	5.5
Apply	27	14.9
Total	181	100
Type of diseases treated with herbs		
Dyspepsia	10	5.8
Cough	34	19.8
Gout	7	4.1
Kidney stone	1	0.6
Diabetes mellitus	5	2.9
Headache	2	1.2
Immune booster (supplement)	11	6.4
Hypertension	31	18.0
Cold	5	2.9
Asthma	1	0.6
Fever	10	5.8
Flatulence	13	7.6
Cholesterol	8	4.7
Toothache	5	2.9
Pain	6	3.5
Diarrhea	5	2.9
Seizure	2	1.2
Bruises	2	1.2
Sore eye	1	0.6
Wounds	3	1.7
Low back pain	5	2.9
Thrush/internal heat	5	2.9
Total	176	100

The profile and distribution of herbals use among the participants according to plant species, plant parts used, methods of preparation and administration, as well as treated conditions are summarized in Table 3 and Table 4. In total, there were 39 plant species used by the respondents for the treatment of different diseases and conditions. Soursop (*Annona muricata* L.) (16.0%), henna (*Lawsonia inermis* L.)

(9.9%), and aromatic ginger (*Kaempferia galanga*) (5.5%) were among most frequently used medicinal plants for the treatment of headache, hypertension, cholesterol, fever, pain, diabetes mellitus, flatulence, cough, and dyspepsia. Henna was also used as a complementary supplement to enhance the immune system. Each plant species was found to be utilized by more than one respondent and most of the respondents were also multi-herbal consumers (Table 3). Leaves were the most common plant parts used for medicines (67.2%), followed by rhizomes (13.1%), fruit (10.9%), seed (4.4%), and stem (4.4%). Most of them were prepared through boiling (32.6%) and squeezing (32.6%), and used as medicines in the form of a drink (77.3%). The elderly often use herbs for the treatment of cough (19.8%), followed by hypertension (18.0%), flatulence (7.6%), dyspepsia (5.8%), and fever (5.8%). Gout, kidney stone, diabetes mellitus, cold, asthma, cholesterol, toothache, pain, diarrhea, seizure, bruises, sore eye, wounds, low back pain, and thrush were also among other conditions treated with herbs in the present study. Herbs were also taken as a supplement to increase immunity (6.4%) (Table 4).

## Discussion

We performed an overview of the use of herbs among the elderly population living in a rural area of Nagan Raya. The distribution of plant species, plant parts used, methods of herbal preparation and administration, as well as the conditions treated were included in the study. A total of 100 participants were enrolled in the study comprising 54% females and 46% males. This finding was in accordance with that reported previously, suggesting that females were more prevalent than males in herbs consumptions (Badan Penelitian dan Pengembangan Kesehatan, 2018) (Riskesdas, 2020). This is somewhat expected as the number of female elderly in Indonesia is higher (52.8%) than that of males (47.2%) according to the result of an inter-censal population survey in 2015 (BPS, 2015). In addition, women living in rural areas have a higher interest in self-care and greater health awareness when compared to males (Dewi, 2019). In terms of age, participants between 60-64 years made up the largest percentage of herbal consumers among the elderly, suggesting that the early-old-age individuals are the most common herbal users in the region of investigation. In addition, participants who received primary educational level, worked as entrepreneurs, and earn less than 1 million rupiahs a month showed the highest percentage of herbal use.

As presented in Table 2, most of the participants in the present study prepared their own herbal medicines (45%). This was in accordance with previous investigations, where the majority of elderly living in rural areas tended to practice self-medication by preparing their own herbal medicines empirically (Balitbangkes Kemenkes RI, 2019; Liana, 2017). Distance to health services and socioeconomic status, such as having a low monthly income, are among some reasons for rural elderly to prepare their own herbs as initial health treatments (Purwandi, 2015; Suharmiati et al., 2020). We found in our investigation that using herbs has become a habit for the majority of respondents (36%). Inherited culture and traditions, as well as communities' attitudes, perceptions, and beliefs toward herbal medicines play important roles in the daily use of herbs (Kusuma et al., 2020; Purnamaningrum, 2019; Riskesdas, 2020). In line with previous studies (Kusuma et al., 2020; Riskesdas, 2020), we also noted that some participants used herbs because they believed that herbal medicines are safer and easily obtainable compared to modern drugs, while others stated that modern medicines are too expensive. More than half of the respondents used herbal medicines at their own initiative (66%), whereas the rest were suggested by family, friends, and health workers. This was a bit contrary to that reported by several previous investigators, suggesting that family and friends were the major sources of information on traditional medicines (Al-Ghamdi et al.,

2017; El-Olemy et al., 2020; Elolemy and AlBedah, 2012). The lack of the elderly's knowledge about modern drugs and a strong belief in herbal medicine safety and efficacy, as suggested by their ancestors, might attribute to the elderly's willingness to utilize herbals on their own initiative in the present study (Handayani et al., 2019; Jabbar and Musdalipah, 2017).

Almost all the participants (94%) did not disclose the use of herbal medicines to medical doctors. The lack of doctors' curiosity about patients' use of herbals, as 69% of respondents reported that doctors did not question the use of herbs by patients, was the main reason for not discussing it with the doctors (Table 2). Another barrier to disclosure might be associated with the lack of the elderly's knowledge about the importance of informing doctors of the use of herbs (Jabbar and Musdalipah, 2017). A similar finding was also observed in the US, Turkey, and Malaysia (Aprilina and Sutrisna, 2013). The majority of the participants (75%) felt better after using herbs; only one respondent experienced adverse reactions such as dizziness, nausea, diarrhea, and itchiness. The efficacy of herbs in curing certain conditions such as diabetes mellitus, gout, and joint pain among elderly population has been reported earlier (Ariesti and Kartikasari, 2018; Hafid, 2019; Stefani, 2020). In case of the presence of adverse reactions, more than half of the patients (69%) will stop using herbs instead of consulting a doctor. The reason for this choice might be that the effects of these reactions did not cause a significant impact on the respondents' daily activities (Marwati and Amidi, 2019).

In this investigation, we recorded 39 plant species used by the elderly for the treatment of more than 20 different diseases, including cough, hypertension, dyspepsia, and fever (Table 3 and 4). The most frequently used plant was soursop (*Annona muricata* L.) (16.0%), followed by henna (*Lawsonia inermis* L.) (9.9%), and aromatic ginger (*Kaempferia galanga*) (5.5%). The use of soursop was associated with the treatment of cough, headache, hypertension, cholesterol, fever, pain, diabetes mellitus, and flatulence. It has been reportedly rich in phytochemical constituents. Around 200 different compounds have been isolated and studied from soursop, including flavonoids, tannins, alkaloids, phenols, and acetogens (Cahyawati, 2020b). The first two constituents have been associated with its therapeutic properties (Fadlilah et al., 2020). Henna was used to treat asthma, cough, hypertension, flatulence, cold, and fever. It was also used as supplement to enhance the immune system. Henna contains coumarin, tannins, flavonoids, and saponin. It also contains lawsone that belongs to naphthoquinone and quinine groups (Nurrani, 2013). Henna has been used by elderly for the treatment of joint pain (Ariesti and Kartikasari, 2018). On the other hand, aromatic ginger was used to cure dyspepsia and flatulence. It has been reportedly rich in essential oils (EOs), alkaloids, saponins, flavonoids, and polyphenols. Its rhizome contains *ethyl paramethoxycinnamate* (EPMS) (Soleh and Megantara, 2019). EOs and alkaloid have been reported to possess therapeutic activities.

Other plants such as sea holly (*Aanthus ilicifolius* L.), betle (*Pipper betle* L.), bay (*Syzygium polyanthum*), Indian trumpet (*Oroxylum indicum*), lemon (*Citrus lemon*), lime (*Citrus aurantifolia*), and turmeric (*Curcuma longa*) were also used for the treatment of cough. The sea holly has been approved by World Health Organization (WHO) and used worldwide for the treatment of cough. The Indonesian Food and Drug Authority (BPOM) reported that sea holly contains *glycyrrhizin* (glycerol) that works as expectorant responsible for the curing of cough (BPOM, 2015). Afterwards, the efficacy of betle in curing cough is attributed to its antibacterial activities (Hasanah and Dewi, 2020), while the efficacy of turmeric is associated with its curcumin anti-inflammatory and antioxidant properties (Rosyidi and Cahyati, 2019). Bay leaves contains EOs and tannins exhibiting antibacterial and antioxidant activities, respectively (Harismah, 2017). Therapeutic properties of lemon and lime



are associated with antimicrobial and antioxidant activities of their alkaloid and saponin content, while Indian trumpet are widely used to treat sore throat due to its flavonoid antimicrobial and anti-inflammatory potentials (Permata et al., 2018).

In regards to the treatment of hypertension, papaya (*Carica papaya* L.) has been reported to possess diuretic properties. Its flavonoid content can function as *angiotensin converting enzyme inhibitor* (ACEI) that plays important role in lowering blood pressure. Cucumber was evidenced to decrease up to 5.5 mmHg systolic and 3 mmHg diastolic pressure, presumably associated with potassium, calcium, and magnesium content (Kharisna et al., 2012). Star fruit (*Averrhoa carambola*), which is high in potassium and low in sodium, is effective for the treatment of hypertension. Soursop contains potassium that is able to stimulate Na<sup>+</sup>K<sup>+</sup>ATPase pump in the vascular smooth muscle resulting in vasodilatation and decreased blood pressure (Hasanah and Dewi, 2020). Several scientific evidences regarding the efficacy of aromatic ginger, moringa (*Moringa oleifera*), and banana (*Musa paradisiaca*) for the treatment of hypertension have also been reported (Cahyawati, 2020a; Fitriani, 2013; Kelor, 2019).

Turmeric (*Curcuma longa*) containing curcuminoids possesses anti-inflammatory properties which are effective for the treatment of dyspepsia. The use of 500 mg oral turmeric powder 4 times/day for a week has significantly decreased abdominal pain (Rosyidi and Cahyati, 2019). Aromatic ginger possesses anti-inflammatory activities due to the presence of tannins and saponins, which is effective in curing dyspepsia-associated inflammations. It has been reported to exhibit carminative properties, which prevent the onset of gas formation and its accumulation in the stomach (Buana et al., 2020). The anti-inflammatory properties of bay leaves are also associated with their potential to cure dyspepsia (Harismah, 2017).

A single investigation reported the potency of peacock flower (*Caesalpinia pulcherrima*) in reducing malaria fever, attributed to its phytochemical constituent of flavonoids (Plaza et al., 2016). This same component in soursop has also been evidenced to exhibit antipyretic activities, where at the concentration of 60% was notably able to reduce fever (Budiarti et al., 2014). Rambutan (*Nephelium lappaceum*) has been found to be more powerful in reducing fever when compared to aspirin. Its flavonoid content was reportedly able to decrease prostaglandin E<sub>2</sub> by 13%, while reduction by aspirin was only 11% (Budiarti et al., 2014). Antipyretic effect was also reported from banana stem water, which at a dose of 0.37mL/200gBW can reduce body temperature by more than 2°C within 1 to 4 hours (Maya, 2015). Candle bush (*Senna alata*) and Kedondong (*Spondias dulcis*), attributed to their flavonoids, have also been revealed to possess antipyretic activities; however, studies regarding antipyretic properties of these two medicinal plants focused mainly on the treatment of dengue (Lestari, 2020; Moniharapon et al., 2019).

In terms of plant parts, leaves were the most common parts used for medicines (68.4%), which was similar to the finding of Medicinal Plant and Herbal Research 2017 (Ristoja 2017) (Purwandi, 2015). Leaves are the most abundant part of the plant and are easy to collect (Purwandi, 2015; Setyowati, 2010). Rhizomes were the second most commonly used parts, which include turmeric, ginger, Javanese ginger (*Curcuma zanthorrhiza*), and aromatic ginger. As summarized in **Table 4**, herbal medicines were prepared mostly through boiling and squeezing (35% each), which was in line with the finding of a previous study (Dewi, 2019). These methods were preferred since more than 3/4 of the respondents (77.3%) took their herbal medicines in the form of a drink.

## Conclusion

Among 100 elderly respondents included in this study, a total 39 plant species were used by the respondents for the treatment more than 20 different diseases. The three most frequently used plants were soursop, henna, and aromatic ginger. The most commonly treated conditions were cough, hypertension, dyspepsia, and fever. Leave was the most common plant part used for medicines, followed by rhizome and fruit. Most of medicines were prepared through boiling and squeezing as the majority of participants consumed them in the form of a drink. The use of herbs by elderlies should be well-monitored since these individuals are often considered a vulnerable population.

## Authors' contributions

Conceptualization: SW, SF and TA; Data curation: ZA, and HA; Formal analysis: VDM, and HNS; Funding acquisition: HNS, and VDM; Investigation: FH and ZA; Methodology: ZA and HA; Project administration: FH, and HA; Resources: SW, and TA; Supervision: SW, and HNS; Validation: ZA, and HA; Writing-original draft preparation: SW, and TA; Writing-review and editing: FH, and SF.

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## Conflict of interest

There is no conflict of interest was reported by the authors.

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