East Asian Journal of Multidisciplinary Research (EAJMR)
Vol. 2, No. 7, 2023: 2759-2776

Medicinal Plants as Treatment for Common Symptoms of COVID-19 in Maibu Village, Butuan City, Philippines

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A R T I C L E I N F O

Keywords: Ethno knowledge, Relative Frequency of Citation, Use Value, COVID-19

Received : 14, May
Revised : 18, June
Accepted: 24, July

A B S T R A C T

This study aimed to provide alternatives to pharmaceutical drugs by using knowledge of medicinal plants as a treatment for illnesses related to the symptoms of COVID-19. Forty traditional healers from the village were invited to serve as informants for this study. Their ages ranged from 50 to above, and those aged 60 had the highest number of informants. A total of 34 plant species belonging to 26 families and 33 genera have been reported as medicinal plants. The relative frequency of citation (RFC) values ranged from 0.525 to 0.025, with Plectranthus amboinicus being the highest (0.525). The use value (UV) ranged between 0.150 and 0.025, indicating a low range, as the study focused only on eight ailments related to COVID-19. Tree species constitute the largest portion of plants; leaves are the most utilized parts, and decoction is the most common method among traditional healers. This study proves that the knowledge and use of herbal medicine for the treatment of various ailments among local people is still a part of their life and culture.

DOI: https://doi.org/10.55927/eajmr.v2i7.4222
ISSN-E: 2828-1517
https://journal.formosapublisher.org/index.php/eajmr

INTRODUCTION

The COVID-19 pandemic has had an enormous impact worldwide. In the Philippines, the term social distancing or physical isolation has been coined as the new normal as a primary preventative method to avoid the spread of the disease. This new social setup has created multiple lifestyle changes worldwide. Business establishments were closed, marketplaces were reduced, and public gatherings prohibited. The struggles varied in class status, but the most vulnerable were poor citizens living with a subsistence daily income. Individuals infected with the virus experience symptoms of mild to moderate respiratory illnesses and recover without requiring special treatment. However, some patients become severely ill and require medical attention. The burden of the COVID-19 pandemic and the widespread disinformation fake news and anti-vaccine comments have generated fear for people, causing them to have better self-medication than going to health facilities, which has led to people seeking alternative treatments as preventive and remedial options such as medicinal plants (Villena-Tejada et al., 2021).

Medicinal plants contain substances that can be used for therapeutic purposes or as precursors in the synthesis of useful drugs (Sofowora et al., 2013; Mahwasane et al., 2013). Pharmaceutical scientists are not the only ones who use medicinal plants to make drugs; ordinary people also use herbal plants as remedies for various illnesses. One of the medicinal plant practitioners are village folks, as they live in mountainous areas far from health facilities. This traditional knowledge of medicinal plants is passed on from generation to generation through family communication and cultural gatherings.

According to the World Health Organization (2019), approximately 80% of the world's population depends on traditional medicine, mostly herbal remedies, for their primary healthcare needs. Herbal medicines are popular in rural societies, particularly those far from cities. They used herbs as an alternative remedy for illness to their traditional practices of how it would be prepared. Owing to the effects of the pandemic, most people prefer to stay home and self-medicate using medicinal plants, especially in areas far from urban centers. Therefore, the researchers conducted an ethnobotanical survey to assess the factors associated with the use of medicinal plants to prevent or treat common illnesses related to COVID-19 symptoms.

Ethnobotanical surveys focus on the complex connection between local inhabitants and plants, including the practices and cultural beliefs associated with different forms of use (Amjad et al., 2020). Because of the current events regarding the spread of the virus and because our scientists have difficulty discovering its cure, this study can provide basic information about medicinal plants that people use to treat common diseases related to the symptoms of COVID-19 and present the importance of medicinal plants (Khadka et al., 2021).

The COVID-19 pandemic has had a substantial impact on people's lives, changing their daily lives and causing negative feelings. Creating fear, anxiety, and depression, as well as the influence of social media on misinformation about medications, leads to public confusion, panic, and the increased use of self-medication, including home remedies. In self-medication, most people use

medicinal plants as remedies to treat illnesses using their traditional practices and knowledge of plant selection and preparation. Because of this issue, the use of medicinal plants has increased, but there is a lack of studies on the medicinal uses of some plant species. An ethnobotanical survey is one way to begin conducting studies by recording and documenting the medicinal plants that we have in our place. This will identify important species, together with indigenous and traditional knowledge of medicinal plants. This will benefit scientists who are developing new drugs instead of randomly testing different plants, and the results of this study can provide information on medicinal plants to target the species that cure human illnesses.

This study is important for discovering the latest information to be used in alternative medicine for ailments related to COVID-19 common symptoms, indigenous abundance, and low costs. Researchers are currently attempting to gain knowledge and discover new medicinal plants.

The main purpose of this study was to document the ethnobotanical use of traditional medicinal plants as remedies for diseases related to common symptoms by people or healers in Maibu Village, Butuan City, and to obtain knowledge that can be used in the analysis of plants to find new applications for the benefit of all humankind. The study also had the following specific objectives: a) to identify and document medicinal plants used by local folks to treat ailments related to COVID-19 common symptoms; b) to explore the ethnomedicinal knowledge of elders and healers in Barangay Maibu, Butuan City; and c) to describe and explain the traditional practices of how medicinal plants are used as remedies for ailments related to COVID-19 common symptoms.

THEORETICAL REVIEW

Ethnobotanical surveys focus on the complex connection between local inhabitants and plants, including the practices and cultural beliefs associated with different forms of use (Amjad et al., 2020). Because of the current events regarding the spread of the virus and because our scientists have difficulty discovering its cure, this study can provide basic information about medicinal plants that people use to treat common diseases related to the symptoms of COVID-19 and present the importance of medicinal plants (Khadka et al., 2021).

METHODOLOGY

Research Design

This study used a qualitative research approach that involved collecting and analyzing non-numerical data to understand concepts, opinions, or experiences. It can be used to gather in-depth insights into a problem or to generate innovative ideas for research. It is used to understand how people use medicinal plants as remedies through traditional practices. Data may be collected qualitatively but analyzed quantitatively using frequencies, percentages, averages, or other statistical analyses to determine relationships.

Description of the Study Sites

The ethnomedical survey was conducted over two months, from January to March 2022, in Maibu Village, Butuan City (Figure 1). The area is remote, with challenging hilly terrain, and is slightly distant from the urban city centers. The residents of the place have a middle socioeconomic status, receive few government services, and lack access to modern healthcare, especially those living in mountainous areas. Roads and other infrastructure are poorly developed, and many residents spend their lives on agriculture, livestock, and small businesses as sources of income to meet their daily needs.

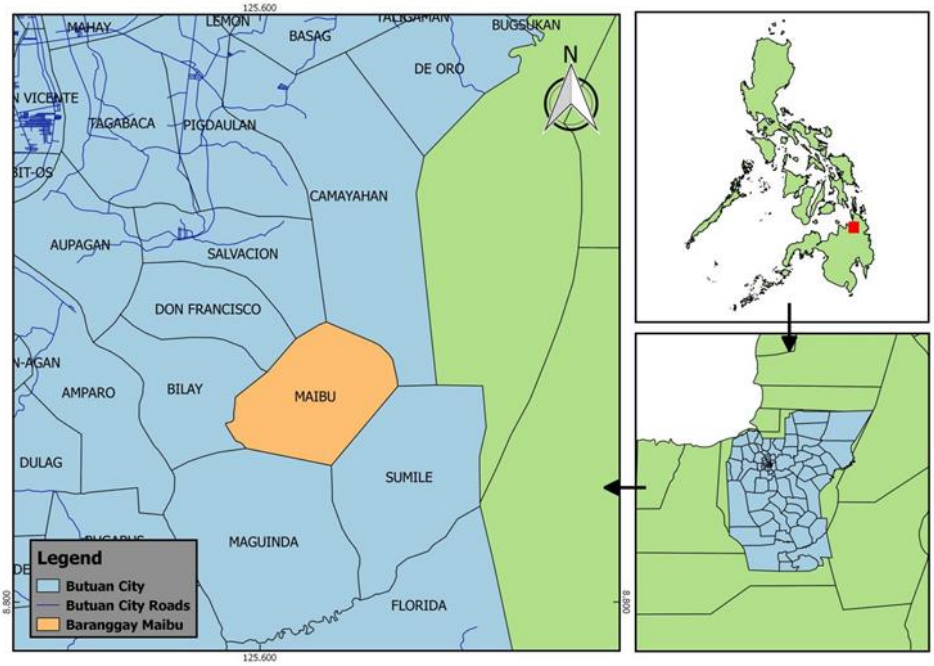

Figure 1: Location of Baranggay Maibu in Butuan City, Philippines (125°36'42.48" N; 8°50'42" E)

Travelling to hospitals for treatment was difficult during the pandemic because of quarantine protocols; therefore, people living in mountainous areas preferred to stay home and apply traditional remedies. In the village, a public health center is available to provide basic health services; however, residents living at higher altitudes have extremely limited access. The elderly had to experience agonizing time walking on foot to receive treatment; thus, some were resolved to provide indigenous ethnomedicinal knowledge.

Sampling Technique

The researchers applied snowball sampling, also called chain-referral sampling, which is a non-probability sampling technique in which samples have traits that are rare. This is a sampling technique in which existing subjects provide referrals to recruit samples required for a research study. This sampling method involves a primary data source and nominating other potential data sources that will be able to participate in research studies. The researcher chose this sampling because we are looking for an informant that is a healer that is rare to identify and elders that are not usually seen anywhere, so we will use referrals from every subject recruited. The researcher selected only respondents

who were knowledgeable and had experience using medicinal plants as remedies for illness, which were the elders and traditional healers.

Data Gathering Procedure

Forty traditional healers with ethnobotanical experience served as the informants of the study. Informed consent was obtained from each participant before they were asked to answer semi-structured questions and provide other related information. Data were collected through face-to-face interviews using the local dialect of 'Bisaya.' The semi-structured interviews included questions on their knowledge of medicinal plants, ailments that the plants treat, parts used, frequency with which these plants are used, and how these parts are prepared and administered for medicinal purposes. The informants also gathered the plants as part of the researchers' field collection, plant observations, and documentation.

Data Analysis

Medicinal plants inventoried in this study were organized in alphabetical order by family name, scientific name, common name, local name, habit of growth, plant part used, preparations and administration, and ailments treated. The results were analyzed using specific quantitative parameters.

Use Value (UV). Its use value demonstrates the relative importance of locally known plants in traditional medicine. The use value (UV) was calculated following Amjad et al., using the formula UV = Ui/n, where Ui is the sum of the total number of use citations by all informants for a given species, divided by the total number of informants (n). The highest use was recorded in the inquiry reports for a given plant. A high UV indicates high use for a plant, implying its relative importance to the local community. A low UV value indicates that there are few reports of its use.

Fidelity Level (FL). The fidelity level (FL) indicated the percentage of informants claiming the use of a certain plant species for the same major purpose. Fidelity level is calculated by following Mrabti et al, with this formula: FL(%) = Np/N x 100 where Np is the number of informants who independently indicated the use of a species for the same major ailment and N is the total number of informants who mentioned the plant for any major ailment. The high-fidelity level (FL) value indicated the maximum frequency of use by informants to treat a particular disease.

Relative Frequency Citation (RFC). Ethnomedicinal information was quantitatively analyzed using an index of the relative frequency of citations. It is calculated by following Mrabti et al. with the formula of RFC = FC/N this index shows the local importance of each species, and it is given by the frequency of citation (FC, the number of informants mentioning the use of the species) divided by the total number of informants participating in the survey (N), without considering the use categories.

Preference ranking of the most commonly used medicinal plant species for every common illness. The values for each species were summarized by all the informants who mentioned the plants for each disease treatment. The

species were then ranked in descending order, with the species with the highest total ranking first.

Descriptive statistics using frequencies and percentages were used to summarize the data using Microsoft Excel, and Microsoft Word was used for the tables and graphs. The ailments treated with the medicinal plants were classified into distinct categories.

RESULTS

Demographic Characteristics of Traditional Healers

Participants were selected based on their understanding of ethnomedicine. Forty traditional healers were interviewed: 13 (32.5%) were males and 27 (67.5%) were females. There were more female than male informants in this study because they were usually left in the household during the daytime, while their husbands were working on the farm or away from home. In terms of age, those aged 60 years or older (92.5%) had the highest frequency of informants, followed by 50-59 years (7.5%).

Table 1. The Demographic Information of the Elderly and Traditional Healers of Maibu, Butuan City

Variable	Informants' Category	N	Percentage	Average Number of Species Reported
Sex	Male	13	32.5%	4.10
	Female	27	67.5%	4.80
	Total	40	100.0%	
Age	50-59	3	7.5%	4.70
	60 above	37	92.5%	4.60
	Total	40	100.0%	
Marital status	Single	0	0.0%	0.00
	Married	29	72.5%	4.31
	Widow	10	25.0%	3.50
	Separated	1	2.5%	9.00
	Total	40	100.0%	
Occupation	Healers	7	17.5%	7.00
	Farmers	11	27.5%	4.18
	Housewife	19	47.5%	4.20
	Retailer	3	7.5%	3.33
	Total	40	100.0%	

Regarding marital status, 72.5% of respondents were married, 25% were widowed, and 2.5% were separated. There were 19 (47.5%) housewives, 11 (27.5%) farmers, seven (17.5%) healers, and three (7.55%) retailers (Table 1).

Diversity Medicinal Plants Recorded

A total of 34 species belonging to 26 families and 33 genera were identified. Among plant families, Lamiaceae was had the highest number of species with 3, followed by Apocynaceae, Asteraceae, Euphorbiaceae, Myrtaceae, Poaceae and Rutaceae with 2 each, and the remaining families represented only by a single species. Table 2 lists the plant families, scientific

names, plant growth habits, common and local names, plant parts used, preparation and administration, and the ailments treated. No previous ethnobotanical study has focused on the diseases related to common COVID-19 symptoms, making the findings of this study significant for identifying important medicinal plant species. According to Yaseen et al. (2019), plant biodiversity is a potentially useful source of novel therapeutic agents.

Table 2 shows that medicinal plants are present in a wide variety of species and are scattered across different plant groups. Medicinal herbs were obtained from backyards and roadside gardens. According to traditional healers, most medicinal plants grow randomly along roads and in-house backyards. They rarely remove plants that grow in their backyards and on the road, because these plants are a source of medicinal plants that can be utilized to cure common diseases in their communities. As Maibu Village is situated close to the forest, there is an abundance of medicinal plants in the area. The availability of plants can play a role in their use as remedies by the elderly and healers.

Lamiaceae (formerly Labiatae), the mint family of flowering plants, is the largest family in the order Lamiales, with 236 genera and more than 7,000 species. The Lamiaceae family is ubiquitous, and many species are grown because of their scented leaves and gorgeous blooms (Britannica, 2021). Herbal plants with flavor, aroma, and medicinal characteristics are particularly valuable to humans.

Table 2. Medicinal Plants Used by the Senior Citizens and Healers from Barangay Maibu, Butuan City, Philippines

Family/Scientific name	Common name	Local name	Habit of growth	Plant parts used	Preparation and administration	Common illnesses treated
Amaryllidaceae						
Allium cepa	Onion	Sibuyas	Herb	Leaves	Boil in water and drink decoction	Fever or chills
Annonaceae						
Annona muricata	Soursop	Rabana	Tree	Leaves	Boil in water and drink decoction.	Fever or chills and Cough
Apiaceae						
Centella asiatica	Gotu kola	Yahong-yahong	Herb	Leaves and stem	Put in a glass of water and drink infused water	Cough and Diarrhea
Apocynaceae						
Plumeria acuminata	Temple flower	Kalachuchi	Tree	Leaves	Pound the leaves and apply topically to the affected area to serve as poultice	Rash on skin
Andrographis paniculata	Serpentina	Maravillosa	Herb	Leaves	Boil in water and drink decoction	Fever or chills and Cough
Arecaceae						
Cocos nucifera	Coconut	Lubi	Palm	Fruit	Apply or rub in infected skin	Rash on Skin
Asteraceae						
Artemisia vulgaris	Mugwort	Hilbas	Herb	Leaves and stem	Rub or massage on the chest and back the pounded leaves and stem	Fever or chills, Cough
Blumea balsamifera	Ngai Camphor	Gabon/Sagbong/Sambong	Shrub	Leaves	Boil in water and drink decoction	Diarrhea
Boraginaceae						
Cordia dichotoma	Soap berry	Anonang	Tree	Leaves	Boil in water and drink decoction	Fever or chills
Bromeliaceae						
Ananas comosus	Pineapple	Pinya	Herb	Fruit	Eat pineapple	Sore throat
Caricaceae						
Carica papaya	Papaya	Kapayas	Shrub	Leaves	Eat green papaya	Sore throat
Cirolanidae						
Coleus blumei	Painted Nettle	Mayana	Herb	Leaves	Boil in water and drink decoction	Cough, sore throat, and diarrhea
Euphorbiaceae						

Euphorbia hirta	Asthma Weed	Tawa-tawa	Herb	Whole plant	Boil in water and drink decoction	Fever or chills
Jatropha curcas	Physic nut	Tuba-tuba	Shrub	Leaves and stem	Boil in water and drink Decoction Heat over fire and apply directly apply on the body	Fever or chills, and Cough
Fabaceae						
Gliricidium sepium	Madre de cacao	Kakawate or Madre de kakaw	Tree	Leaves	Apply leaf sap or pounded leaves as a poultice	Rash on skin
Lamiaceae						
Hyptis capitata Jacq.	Knobweed	Sawan-sawan	Herb	Leaves	Drink decoction or leaf sap	Fever or chills, Cough and Diarrhea
Plectranthus amboinicus	Oregano	Kalabo or Karabo	Herb	Leaves	Pound, squeeze to obtain extract, and take one tablespoon	Cough
Vitex negundo	Five-leaved Chaste tree	Lagundi	Tree	Leaves	Put in a glass of water and drink infused water	Cough
Lauraceae						
Persea Americana	Avocado	Avocado	Tree	Leaves	Boil in water and drink decoction	Fever or chills and Diarrhea
Meliaceae						
Sandoricum koetjape	Wild mangosteen	Santol	Tree	Fruit	Open and eat fleshy part	Diarrhea
Menispermaceae						
Tinospora crispa	Heavenly elixir	Panyawan	Vine	Stem	Scrape the stem and eat	Cough
Moraceae						
Ficus septica	Septic fig (hauili)	Labnog/Lagnob	Tree	Leaves Young shoot	Heat over fire and apply directly on affected area. Boil in water and drink decoction	Headache
Myrtaceae						
Psidium guajava	Guava	Bayabas	Tree	Young leaves	Boil in water, use as an antiseptic wash or disinfectant	Rash on skin
Syzygium aqueum	Water apple	Tambis	Tree	Roots	Boil in water, use as an antiseptic wash or	Rash on skin

					disinfectant	
Muntingiaceae						
Muntingia calabura	Jamaica cherry	Mansanitas	Tree	Young shoot	Boil leaves in water and drink decoction	Fever or chills
Musaceae						
Musa x paradisiaca	Banana	Saging (tundan)	Herb	Fruit	Peel and eat.	Diarrhea
				Young leaves	Put leaves directly on the lower portion of the abdomen	
Piperaceae						
Piper betle	Betel pepper	Buyo	Herb	Leaves	Boil in water and drink decoction	Cough
Poaceae						
Cymbopogon citratus	Lemon Grass	Tanglad	Grass	Whole Plant	Boil in water and drink decoction	Cough
Eleusine indica	Water apple	Paragis o bila-bila	Grass	Whole plant	Boil in water and drink decoction	Cough
Rubiaceae						
Neonauclea formicaria	Bangkal	Ambabalod	Tree	Leaves	Boil in water and drink decoction	Fever or chills
Rutaceae						
Citrus maxima	Grapefruit (pomelo)	Buongon	Tree	Leaves	Pound until soft and apply directly to infected area	Headache
Citrus x *microcarpa*	Kalamansi	Lemonsito	Tree	Fruit	Squeeze the juice into a glass, add water and drink	Cough
Sapotaceae						
Chrysophyllum cainito	Star apple	Caimito	Tree	Leaves	Boil in water and drink decoction	Diarrhea
Zingiberaceae						
Zingiber officinale	Ginger	Luy-a	Herb	Rhizome	Boil in water and drink decoction	Cough

In addition to other families such as Apocynaceae, all members of this family are poisonous, and many species are used medicinally because of the presence of cardiac glycosides and various alkaloids. Several ornamental plants are cultivated because of their attractive flowers and foliage. In traditional medicine, the family Apocynaceae is used to treat fever, malaria, pain, and skin and ecto-parasitic diseases.

Relative Frequency of Citation and Use Value

According to Vitalini et al. (2013), the relative frequency of citation (RFC) is utilized to determine the extremely important species in various diseases, as mentioned by the local people. It was calculated using the formula RFC = FC/N, which shows the local importance of each species and is given by the frequency of citation (FC, the number of informants who mentioned the use of the species) divided by the total number of informants who participated in the survey (N), without considering the use categories.

The RFC values ranged from 0.525 to 0.025. Plectranthus amboinicus had the highest RFC value (0.525), followed by Euphorbia hirta (0.475), Carica papaya (0.4), and Psidium guajava (0.325). These species are abundant, have high RFC values in the area, and have been familiar with them for a long time, especially from an ethnomedicinal perspective. Plants with outstanding healing abilities are well known in local cultures, and their precise properties for treating certain diseases are well established. Plant species with high RFC values may be used for phytochemical and pharmacological profiling and for commercial authentication for drug development in the future.

The value of use reflects the relative importance of each species, with reference to usage reports cited by local informants. UV was calculated using the formula UV = Ui/n, where Ui is the sum of the total number of use citations by all informants for a given species divided by the total number of informants (n). The use value ranged between 0.15 and 0.025, which shows a low range of use value because the study only focused on ailments related to COVID-19, which has only eight ailments. The species with the highest usage values were Andrographis paniculata (0.15), Artemisia vulgaris (0.15), Jatropha curcas (0.1), and Muntingia calabura (0.1). The UV value was linked to the use reports.

Plant species with a high use value have more usage reports and vice versa (Qaseem et al., 2019). These plant species are used repetitively and are biologically active (Trotter et al. 1986). It is not essential that plants with low UV values become biologically inactive. Other plant species are still significant in terms of different standards and may change because indigenous people's knowledge varies from place to place or within a single area.

Medicinal plants with high RFC and UV have great potential for disease healing. Residents commonly overharvest RFC and UV-rich species; therefore, they are prioritized for conservation and long-term use. Otherwise, they become extinct (Kayani et al. 2014). Ethnotanical knowledge is in danger because there may be no resources left to future generations. for their health. The major reason for this is that residents, particularly the younger generations,

have little interest in ethnomedicinal plants and are already reliant on allopathic treatment for healthcare.

Table 3. Quantitative Analysis of Ethnobotanical Data

Family Name	Scientific Name	Common name	UV	RFC
Amaryllidaceae	*Allium cepa*	Onion	0.050	0.050
Annonaceae	*Annona muricata*	Soursop	0.025	0.025
Apiaceae	*Centella asiatica*	Gotu kola	0.050	0.050
Apocynaceae	*Plumeria acuminata*	Temple flower	0.025	0.025
Apocynaceae	*Andrographis paniculata*	Serpentina	0.150	0.175
Arecaceae	*Cocos nucifera*	Coconut	0.025	0.050
Asteraceae	*Artemisia vulgaris*	Mugwort	0.150	0.250
Asteraceae	*Blumea balsamifera*	Ngai camphor	0.075	0.300
Boraginaceae	*Cordia dichotoma*	Soap berry	0.025	0.025
Bromeliaceae	*Ananas comosus* (L.) Merr.	Pineapple	0.025	0.025
Caricaceae	*Carica papaya*	Papaya	0.050	0.400
Cirolanidae	*Coleus blumei*	Painted Nettle	0.025	0.050
Euphorbiaceae	*Euphorbia hirta*	Asthma weed	0.050	0.475
Euphorbiaceae	*Jatropha curcas*	Physic nut	0.100	0.225
Fabaceae	*Gliricidium sepium*	Madre de cacao	0.025	0.025
Lamiaceae	*Hyptis capitata* Jacq.	Knobweed	0.025	0.050
Lamiaceae	*Plectranthus amboinicus*	Oregano	0.075	0.525
Lamiaceae	*Vitex negundo*	Five-leaved Chaste tree	0.050	0.200
Lauraceae	*Persea Americana*	Avocado	0.050	0.125
Meliaceae	*Sandoricum koetjape*	Wild mangosteen	0.025	0.025
Menispermaceae	*Tinospora crispa*	Heavenly elixir	0.025	0.100
Moraceae	*Ficus septica*	Septic fig (hauili)	0.075	0.050
Myrtaceae	*Psidium guajava*	Guava	0.050	0.325
Myrtaceae	*Syzygium aqueum*	Water apple	0.050	0.075
Muntingiaceae	*Muntingia calabura*	Jamaica cherry	0.100	0.175
Musaceae	*Musa x paradisiaca*	Banana	0.025	0.025
Piperaceae	*Piper betle*	Betel pepper	0.050	0.100
Poaceae	*Cymbopogon citratus*	Lemon grass	0.050	0.100
Poaceae	*Eleusine indica*	Water apple	0.025	0.025
Rubiaceae	*Neonauclea formicaria* (Elmer) Merr.	Bangkal	0.025	0.025
Rutaceae	*Citrus maxima*	Grapefruit (pomelo)	0.025	0.025
Rutaceae	*Citrus* x *microcarpa*	Kalamansi	0.075	0.200
Sapotaceae	*Chrysophyllum cainito*	Star apple	0.025	0.050
Zingiberaceae	*Zingiber officinale*	Ginger	0.025	0.025

Fidelity Level

The fidelity level shows the preferences of the local people for specific plant species to address specific ailments in the area. This was calculated using the formula FL (%) = Np/N × 100, where Np is the number of informants who independently indicated the use of a species for the same major illness, and N is the total number of informants who mentioned the plant for any major ailment. The FL values of the reported species ranged from 57.1 to 100%. The fidelity values of four plant species, Euphorbia hirta, Artemisia vulgaris, Carica papaya, and Persea Americana, were 100%, and these species were used to cure fever, chills, sore throat, and diarrhea. Other medicinal plants with high FL values were Plectranthus amboinicus (95.2%), Psidium guajava (76.9%), and Andrographis paniculata (71.4%) (Table 5). These species are used to treat cough, congestion, runny noses, and rashes.

A high FL of a species indicates that it is widely used to treat a specific ailment prevalent in the area (Srithi et al. 2009). Model plants with high FL values should be further studied pharmacologically. In terms of ethnomedicinal knowledge, the species with low FL values were unknown to residents.

Table 4. Fidelity Levels (FL) of Most Used Plants in Every Common Illness Treated by the Informants

Plant species	Ailments treated	NP	N	FL (%)
Euphorbia hirta	Fever or chills	19	19	100.0%
Artemisia vulgaris	Fever or chills	10	10	100.0%
Carica papaya	Sore throat	16	16	100.0%
Persea Americana	Diarrhea	5	5	100.0%
Plectranthus amboinicus	Cough	20	21	95.2%
Psidium guajava	Rash on skin	10	13	76.9%
Andrographis paniculata	Congestion or runny nose	5	7	71.4%

Ranking of Most Utilized Medicinal Plant in the Village

Plectranthus amboinicus was highly rated and regarded as the most important in the treatment of cough in the study area. Table 6 shows the list of the ten most utilized medicinal plant species by informants in descending order, together with the number of informants who cited the medicinal plant species. Key ailments treated with preferred medicinal plants were determined by selecting the most frequently cited ailments by all informants.

Table 5. The Top Ten Most Used Medicinal Plant Species in Maibu, Butuan City

Medicinal plant species	Key ailments treated	Number of informants	Ranking
Plectranthus amboinicus	Cough	21	1st
Euphorbia hirta	Fever or chills	19	2nd
Carica papaya	Sore throat	16	3rd
Psidium guajava	Rash on skin	13	4th
Blumea balsamifera	Fever or chills	12	5th
Artemisia vulgaris	Fever or chills	10	6th
Jatropha curcas	Cough	9	7th
Citrus x *microcarpa*	Cough	8	8th
Vitex negundo	Cough	8	8th
Andrographis paniculata	Headache	7	9th
Muntingia calabura	Fever or chills	7	9th
Persea Americana	Diarrhea	5	10th

Habit of Growth

The growth habits of these medicinal plants are shown in Figure 2. Of the 34 species, trees constituted the largest proportion, with 15 plant species (44.1%), followed by herbs with 12 species (35.3%), shrubs with three species (8.8%), grasses with two species (5.9%), vines with one species (2.9%), and palms with one species (2.9%) (Fig. 2).

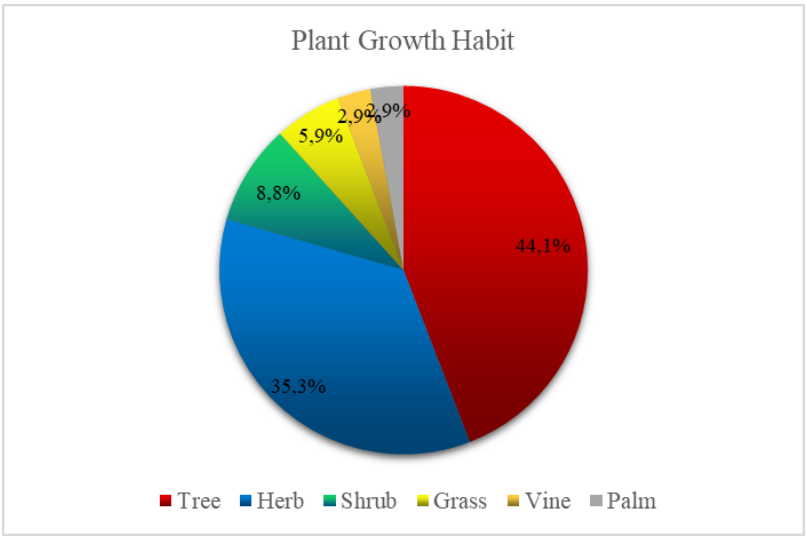

Figure 2. The Growth Habits of Medicinal Plant Species Used by Folks and Traditional Healers from Maibu, Butuan City, Philippines

Plant Parts Used

Various plant components were used for the preparation of herbal remedies, and so leaves received the highest percent as the commonly used part, which composed of 59%, followed by fruit (12.8%), stem (10.3%), whole plant (7.7%), shoot (5.1%), roots (2.6%) and rhizome (2.6%) (Fig. 3).

Leaves were ranked as the most used part because of their easy availability and because they pose less of a threat to the local flora. The survival and continuity of Maibu's medicinal plants are maintained and preserved through the use of leaves, ensuring the long-term use of medicinal plants.

According to Hamel et al. (2018), the frequent use of leaves is supported by the abundance of chemical groups, as leaves are the sites of secondary metabolite formation. Furthermore, photosynthesis allows leaves to store many chemical compounds, which are the active ingredients in most herbal preparations, at high concentrations (Guevara and Garcia 2018).

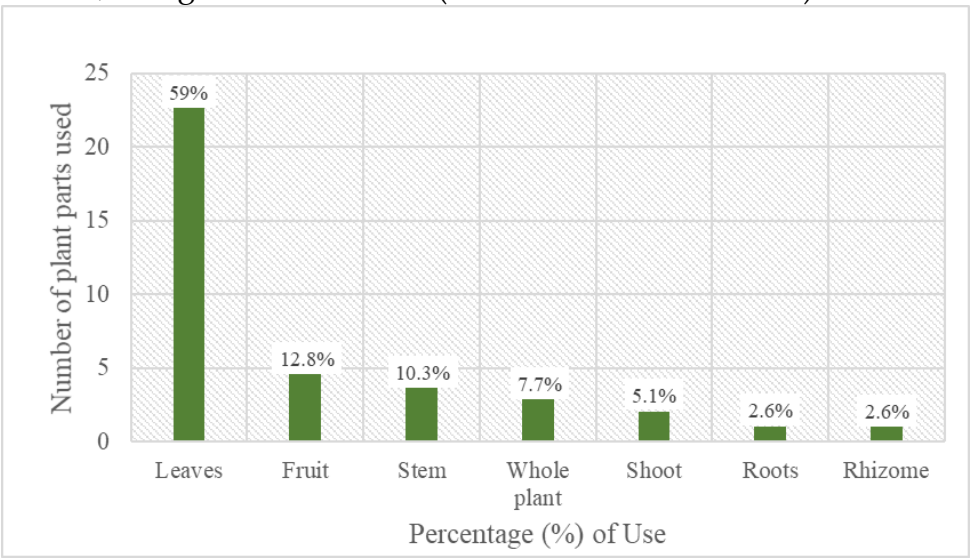

Figure 3. Plant Parts Used in Herbal Preparations by Folks and Healers from Maibu, Butuan City, Philippines

Method of Preparation

Medicinal herbs are prepared and administered differently, depending on the disease being treated. Six preparation methods were used in this study. The method of extraction by boiling (decoction) had the highest percentage (50 %), followed by raw food (13.2%), intrusion (10.5%), poultice (10.5%), rubbing (5.3%), extraction (5.3%), and heating (5.3%) (Fig. 4).

Decoction is a method of extraction that involves boiling herbal or plant materials (which may include stems, roots, bark, and rhizomes) to dissolve the chemicals in the material. A raw food diet primarily consists of unprocessed whole plant-based foods that are ideally organic. People believe that it has the potential to improve their health and well-being, while also lowering their risk of developing medical disorders. Infusion was performed to prepare freshly collected plant parts by soaking the selected parts in water and then drinking them. To quickly cure the cuts and wounds, the leaves or the entire plant were mashed into a poultice and immediately administered to the injured area.

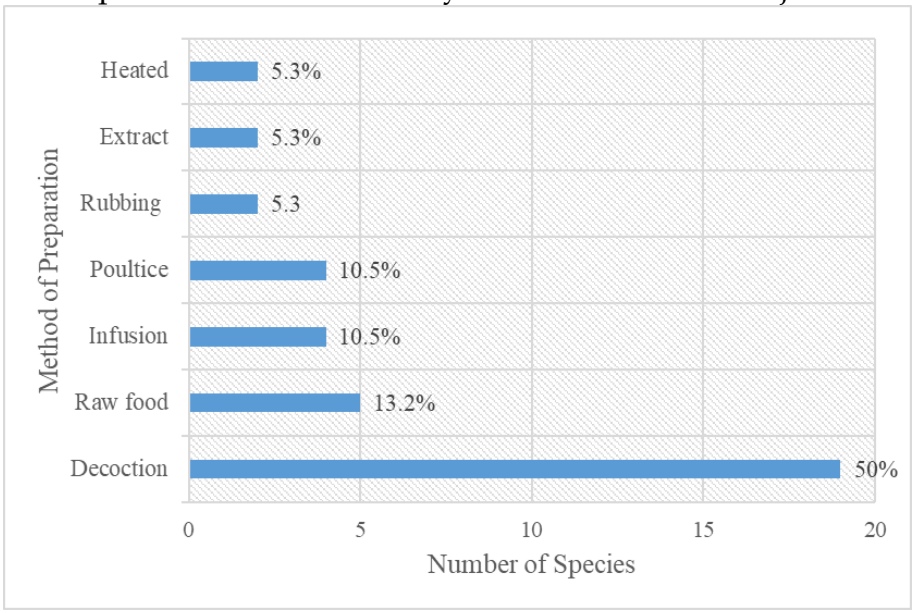

Figure 4. Method of Preparation of Medicinal Plants Used by the Senior Citizens and Healers from Baranggay Maibu, Butuan City, Philippines

This study highlights the importance of traditional knowledge systems in understanding the use of plants as an alternative source of relief for various symptoms related to COVID-19. The information gathered provides valuable insights into the relationships between humans and plants and may aid in the development of sustainable conservation strategies for these vital resources. Further research and collaboration with local communities are necessary to fully appreciate the vast wealth of knowledge and practices involving plant use worldwide.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study revealed that the plants were still medicinally used by the local people in the study region. Such plants are especially beneficial to people who cannot afford advanced medical treatment or who do not have

easy access to modern health facilities. Knowledge and use of herbal medicine for the treatment of various ailments among the local people is still a part of their life and culture, and this calls for the preservation of the integrity of the forest and indigenous knowledge of herbal medicine use.

People know how to utilize plants for generations to heal ailments; however, few have been documented. This ethnobotanical knowledge record serves as a catalog of the residents' helpful plants and a tangible record of their culture for the education of future generations. This will help strengthen the culture by acknowledging and scientifically validating the traditional knowledge of medicinal plants. This can aid in the preservation of the traditional knowledge of elderly residents and healers, which is progressively fading due to modernization and the impact of advanced communities. Documented plants have the potential to be used in drug development and provide basic information on medicinal plants that can be used to cure ailments related to the symptoms of COVID-19.

FURTHER STUDY

Further research and collaboration with local communities are necessary to fully appreciate the vast wealth of knowledge and practices involving plant use worldwide.

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